Luton Rising
Our airport.
Our community.
Our planet.

April 2023

London Luton Airport Expansion

Planning Inspectorate Scheme Ref: TR020001

Volume 5 Environmental Statement and Related Documents

5.01 Chapter 8 Biodiversity

Application Document Ref: TR020001/APP/5.01
APFP Regulation: 5(2)(a)

The Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

London Luton Airport Expansion Development Consent Order 202x

5.01 ENVIRONMENTAL STATEMENT CHAPTER 8: BIODIVERSITY

Regulation number:	Regulation 5(2)(a)
Planning Inspectorate Scheme Reference:	TR020001
Document Reference:	TR020001/APP/5.01
Author:	Luton Rising

Version	Date	Status of Version
Issue 1	February 2023	Application issue
Revision 1	April 2023	Redacted following section 51 advice

Contents

Tables

8 BIODIVERSITY

8.1 Introduction

8.1.1 This chapter presents the assessment of likely significant effects of the Proposed Development on biodiversity. Details of the Proposed Development are described in **Chapter 4** of this Environmental Statement (ES) **[TR020001/APP/5.01]**.

8.1.2 The EIA Scoping Report provided in **Appendices 1.1** and **1.2** of this ES **[TR020001/APP/5.05]**, set out the proposed scope for the assessment of biodiversity. In summary, the following have been assessed in this ES:

a. designated nature conservation sites;

b. important habitats including Section 41 priority habitats listed under the Natural Environment and Rural Communities (NERC) Act 2006 (Ref. 8.1);

c. protected species; and

d. notable flora and fauna.

8.1.3 Within these, receptors are assessed in terms of whether there is the potential for an effect. Where there is a potential, then these receptors are then scoped into the detailed assessment to determine if there is likely to be a significant effect. Where there are no pathways for an effect, or effects are not considered likely to be significant, then these receptors are scoped out of the further assessment, refer to **Section 8.3**.

8.1.4 Where practicable, the Proposed Development has been designed to avoid or reduce adverse effects on important ecological features and deliver benefits for biodiversity in accordance with policy and best practice. This chapter documents those measures adopted to mitigate significant ecological effects.

8.1.5 This chapter includes an assessment of the potential effects on nationally and locally designated nature conservation sites and important ecological features. For internationally designated nature conservation sites, this chapter draws upon the Habitat Regulations Assessment (HRA) No Significant Effects Report (NSER) (**Appendix 8.3** of this ES **[TR020001/APP/5.08]**), which provides the necessary information for the competent authority (in this case the Secretary of State) to undertake an assessment under the Conservation of Habitats and Species Regulations 2017 (as amended) (SI 2017 No. 1012) (the 'Habitats Regulations') (Ref. 8.5).

8.1.6 Both this chapter and the HRA NSER (**Appendix 8.3** of this ES **[TR020001/APP/5.08]**) are supported by evidence gathered from desk studies, field surveys, and the assessments for **Chapter 7** Air Quality, **Chapter 14** Landscape and Visual, **Chapter 16** Noise and Vibration, **Chapter 20** Water Resources and Flood Risk and **Chapter 21** In-combination and Cumulative Effects Assessment of this ES **[TR020001/APP/5.01]**.

8.1.7 To provide a high-level quantification of the level of biodiversity that will be lost to the Proposed Development and the habitat creation/enhancement

requirement, a Biodiversity Net Gain (BNG) calculation has been undertaken using the available Defra (Department for Environment, Food and Rural Affairs) metric version 3.1 (Ref. 8.2), with the Applicant making a commitment to deliver 10% net gain which is consistent with the Environment Act 2021 (Ref. 8.3) (albeit the relevant provisions of that Act are not yet in force). The BNG assessment is presented in **Appendix 8.5** of this ES **[TR020001/APP/5.02]**.

8.1.8 This chapter also includes an overview of the measures that are proposed to mitigate the effects upon ecological receptors. Prescriptions for the establishment, long term management and monitoring of habitat creation measures are included within the Outline Landscape and Biodiversity Management Plan (Outline LBMP) (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**).

8.1.9 The remainder of this chapter consists of:

a. **Section 8.2** Legislation, policy and guidance relevant to the scope and methodology of the biodiversity assessment;
b. **Section 8.3** Scope of the assessment;
c. **Section 8.4** Stakeholder engagement undertaken to inform the assessment;
d. **Section 8.5** Methodology applied to the assessment;
e. **Section 8.6** Assumptions and limitations;
f. **Section 8.7** Baseline conditions;
g. **Section 8.8** Embedded and good practice mitigation;
h. **Section 8.9** Assessment;
i. **Section 8.10** Additional mitigation;
j. **Section 8.11** Residual effects;
k. **Section 8.12** In-combination climate change;
l. **Section 8.13** Monitoring; and
m. **Section 8.14** Assessment summary.

8.2 Legislation, policy and guidance

8.2.1 This section identifies the key legislation, policy and guidance relevant to the scope and methodology for the biodiversity assessment which inform the type of mitigation measures that would be incorporated into the Proposed Development during construction and/or operation.

8.2.2 **Table 8.1** to **Table 8.4** provides a description of the relevant legislation, policy and guidance, and identify how and where each of these have been addressed in the ES.

Legislation

Table 8.1: Biodiversity legislation

Legislation	How and where addressed in ES
European Union (Withdrawal Agreement) Act 2020 ('the Withdrawal Act') (Ref. 8.4). The UK left the EU on 31 January 2020 under the terms set out in the Withdrawal Act. This established a transition period, which ended on 31 December 2020. From 1 January 2021, the ecological protection previously afforded by the Conservation of Habitats and Species Regulations 2017 (as amended) continues, including by amendments set out in the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (these do not replace the 2017 Regulations but make consequential amendments) which includes creation of the National Site Network in place of the previously known Natura 2000 sites.	The biodiversity assessment provides an assessment of the potential for the Proposed Development to have effects on designated nature conservation sites, habitats and species protected under this legislation and forms part of the rationale for their stated importance in compliance with the Conservation of Habitats and Species Regulations 2017 (as amended) (see below). Addressed in **Section 8.9 and 8.14**, and also within the HRA NSER (**Appendix 8.3** of this ES **[TR020001/APP/5.08]**).
Environment Act 2021 (Ref. 8.3). The Environment Act 2021 will require Nationally Significant Infrastructure Projects (NSIPs) to include a 10% biodiversity net gain (BNG), however the relevant provisions are not yet in force. The Environment Act 2021 requires the Secretary of State to set long-term targets (15-year minimum) for biodiversity. This target has not yet been set but will be kept under review.	A Defra BNG calculation has been undertaken on a voluntary basis following guidance produced by Defra and uses The Biodiversity Metric 3.1 developed by Natural England (Ref. 8.2) to allow biodiversity losses and gains to be quantified. This metric was the version available at the time this ES was produced and has been used to guide the habitat creation measures designed into the Proposed Development to ensure a net gain in biodiversity. The results are presented in **Appendix 8.5** of this ES **[TR020001/APP/5.02]**.

Legislation	How and where addressed in ES
The Conservation of Habitats and Species Regulations 2017 (as amended) (Ref. 8.5). The Conservation (Natural Habitats and c.) Regulations 1994 initially transposed the provisions of Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Flora and Fauna (Habitats Directive) into UK law. The Conservation of Habitats and Species Regulations 2017 further enact the Habitats Directive within England and Wales. Part 2 of these Regulations covers the selection, designation, registration and management of European sites (previously known as Natura 2000 sites and now the National Site Network). Schedule 2 of the Regulations lists the European protected species of animals whilst Schedule 5 lists the European protected species of plants. Conservation Objectives (referred to within Article 6(3) of the Habitats Directive) ensure that the European protected species identified as qualifying features of a national site network (formerly known as Natura 2000) site remain or reach favourable condition (such as by maintaining the extent and distribution of habitats of qualifying features). This means that where the Proposed Development may affect a Conservation Objective of a European protected site, the design will need to include appropriate measures to ensure the Conservation Objectives are not adversely affected. From 1 January 2021, the ecological protection previously afforded by the Conservation of Habitats and Species Regulations 2017 (as amended) continues, including by amendments set out in the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (which do not replace the 2017 Regulations but make consequential amendments).	The biodiversity assessment provides an assessment of the potential for the Proposed Development to have effects on designated nature conservation sites, habitats and species protected under this legislation and forms part of the rationale for their stated importance in compliance with the Conservation of Habitats and Species Regulations 2017 (as amended). Addressed in **Section 8.9 and 8.14**, and also within the HRA NSER (**Appendix 8.3** of this ES **[TR020001/APP/5.08]**).
Natural Environment and Rural Communities Act 2006 (Ref. 8.1).	The biodiversity assessment provides an assessment of the potential effects that the Proposed Development will have on designated nature conservation sites,

Legislation	How and where addressed in ES
Section 40 of the Natural Environment and Rural Communities (NERC) Act 2006 sets out the duty for public authorities to conserve biodiversity in England. Habitats and species of principal importance for the conservation of biodiversity identified by the Secretary of State, in consultation with Natural England, are referred to in Section 41 of the NERC Act 2006 for England. The list, known as the 'England Biodiversity List', of habitats and species can be found on the Natural England web site. The 'England Biodiversity List' is used as a guide for decision makers such as public bodies, including local and regional authorities, in implementing their duty under Section 40 of the NERC Act 2006 to have regard to the conservation of biodiversity in England when carrying out their normal functions.	habitats and species protected under this legislation and forms part of the rationale for their stated importance in compliance with this Act. Addressed in **Section 8.9** and **8.14**.
Countryside and Rights of Way Act 2000 (Ref. 8.6). The Countryside and Rights of Way (CRoW) Act 2000 applies to England and Wales only. Part III of the Act deals specifically with wildlife protection and nature conservation. Section 77 of the CRoW Act inserts the provision for Ramsar sites after Section 37 of the Wildlife and Countryside Act 1981 (as amended), including the requirement for notifications of where each Ramsar site is located within England and Wales to the appropriate statutory body, and then to all local planning authorities, landowners, occupiers, the Environment Agency (EA), and relevant undertakers associated with each site. Schedule 9 of the CRoW Act amends the Sites of Special Scientific Interest (SSSI) provisions of the Wildlife and Countryside Act 1981 (as amended), including increased	The biodiversity assessment provides an assessment of the potential effects that the Proposed Development will have on designated nature conservation sites, habitats and species protected under this legislation and forms part of the rationale for their stated importance in compliance with this Act. Addressed in **Section 8.9** and **8.14**.

Legislation	How and where addressed in ES
powers for the protection and management of SSSIs. The provisions extend powers for entering into management agreements; place a duty on public bodies to further the conservation and enhancement of SSSIs; increase penalties on conviction where the provisions are breached; and include an offence whereby third parties can be convicted for damaging SSSIs. Schedule 12 of the CRoW Act amends the species provisions of the Wildlife and Countryside Act 1981 (as amended), strengthening the legal protection for threatened species. The provisions make certain offences 'arrestable', include an offence of reckless disturbance, confer greater powers to police and wildlife inspectors for entering premises and enable heavier penalties on conviction of wildlife offences.	
Hedgerows Regulations 1997 (Ref. 8.7). The wildlife, landscape and historical criteria specified in the Regulations are used to identify what constitutes an 'Important' hedgerow. 'Important' hedgerows are protected from removal (up-rooting or otherwise destroying) without permission from the relevant authority. The local planning authority is also the enforcement body for offences created by these Regulations. Local planning authority permission is normally required before removing hedges that are at least 20m (66 feet) in length, more than 30 years old and contain certain plant species.	The biodiversity assessment provides an assessment of the potential effects that the Proposed Development will have on hedgerows in compliance with these Regulations. Addressed in **Section 8.9** and **8.14**.
Protection of Badgers Act 1992 (Ref. 8.8). Badgers (*Meles meles*) are protected by the Protection of Badgers Act 1992 and are listed under Annex II of the Convention on the Conservation of European Wildlife and Natural Habitats 1979 ('the Bern Convention') (Ref. 8.9). These legislative measures are based primarily on the need	The biodiversity assessment provides an assessment of the potential effects that the Proposed Development will have on badgers, and potential mitigation required in compliance with this Act. Addressed in **Section 8.9** and **8.14**.

Legislation	How and where addressed in ES
to protect badgers from baiting and deliberate harm or injury.	
Wildlife and Countryside Act 1981 (Ref. 8.10). The Wildlife and Countryside Act 1981 (as amended) is the major domestic legal instrument for wildlife protection in the UK, and is the primary means by which the following are implemented: a. the Bern Convention; b. Convention on the Conservation of Migratory Species of Wild Animals ('the Bonn Convention') (Ref. 8.11); and c. Directive 2009/147/EC on the Conservation of Wild birds (the 'Birds Directive') (Ref 8.12).	The biodiversity assessment provides an assessment of the potential effects that the Proposed Development will have on designated nature conservation sites, habitats and species protected under this legislation and forms part of the rationale for their stated importance in compliance with this Act. Addressed in **Section 8.9** and **8.14**.
The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref 8.13). The Water Framework Directive (WFD) 2000/60/EC was adopted and came into force in 2000 and represents a culmination in European Union (EU) water resource protection. The WFD is transposed into law in England and Wales by The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (as amended). The Directive and enacting Regulations aim to achieve 'good status' for all groundwaters and surface waters (rivers, lakes, estuaries, coastal waters) according to biological, hydro morphological, physico-chemical and chemical criteria. From 1 January 2021, the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 has been retained in UK law following exit from the EU.	The biodiversity assessment provides an assessment of the potential effects that the Proposed Development will have on watercourse protected under this legislation and forms part of the rationale for their stated importance in compliance with these Regulations. Addressed in **Section 8.9 and 8.14.** Refer to **Chapter 20** of this ES **[TR020001/APP/5.01]**.
Invasive Alien species (Permitting and Enforcement) Order 2019 (Ref 8.14)	The biodiversity assessment provides an assessment of the potential effects that the Proposed Development will have on invasive species present which are listed under this legislation, and forms part of the

Legislation	How and where addressed in ES
The Invasive Alien Species (Enforcement and Permitting) Order 2019 came into effect on 1st December 2019. This implemented the EU Invasive Alien Species Regulation 1143/2014 (Ref 8.15) on the prevention and management of invasive alien plant and animal species in England and Wales, including the relevant licenses, permits and rules for keeping invasive alien species. If it is not a species of special concern, then the Wildlife & Countryside Act 1981, as amended (Section 14, Schedule 9) (Ref. 8.10) still applies.	rationale for their stated importance in compliance with this Order. Addressed in **Section 8.9** and **8.14**.

Policy

Table 8.2: Biodiversity policy (excluding Airports National Policy Statement)

Policy	How and where addressed in ES
National Planning Policy Framework (2021) (Ref. 8.16). The National Planning Policy Framework (NPPF) sets out the Governments planning policies for England and how these are expected to be applied by Local Authorities within their Local Development Frameworks (LDF). Chapter 15 of the NPPF 'Conserving and enhancing the natural environment' sets out the requirements to consider biodiversity in planning decisions. Paragraphs 179 to 182 stipulate requirements to protect and enhance biodiversity (179), set out the principles a local planning authority should apply when determining planning applications (180), identify that sites that are currently afforded preliminary etc status should be given the same protection as habitat sites (181), and that the presumption in favour of sustainable development does not apply where the plan or project is likely to have a significant effect on a habitats site (either alone or in combination with other plans or projects), unless an appropriate assessment has concluded that the plan or project will not	The biodiversity assessment provides an assessment of the potential effects that the Proposed Development will have on designated nature conservation sites, habitats and species as per the policies listed within the NPPF. Addressed in **Section 8.9** and **8.14**.

Policy	How and where addressed in ES
adversely affect the integrity of the habitats site (182). The NPPF is supported by Planning Practice Guidance (PPG) of which those in relation to biodiversity and ecosystems within the Natural Environment PPG are of relevance.	
National Policy Statement for National Networks – December 2014 (NPSNN) (Ref. 8.17) The NPSNN sets out the need for, and Government's policies to deliver, development of nationally significant infrastructure projects on the national road and rail networks in England. It provides planning guidance for promoters of NSIPs on the road and rail networks. There are no elements of the Proposed Development on the national road or rail network that would be classified as a NSIP in their own right. However, the NPSNN remains an important and relevant consideration, particularly as works are proposed on the Strategic Road Network (SRN) at Junction 10 of the M1 as part of the Proposed Development. Where the relevant polices of the NPSNN are consistent with the relevant policies of the ANPS, they have not been repeated here and accordingly the ANPS compliance **Table 8.3** provides the necessary policy response. Section 5.36 in the NPSNN, which is of relevance and is not mirrored in the ANPS, states that: *"Applicants should include appropriate mitigation measures as an integral part of their proposed development, including identifying where and how these will be secured. In particular, the applicant should demonstrate that*: a. *during construction, they will seek to ensure that activities will be confined to the minimum areas required for the works;* b. *during construction and operation, best practice will be followed to*	The measures detailed within **Sections 8.8** and **8.10**, along with those within the CoCP (**Appendix 4.2**, of this ES **[TR020001/APP/5.02]**), have been designed to ensure that impacts of the Proposed Development on ecological receptors are avoided, reduced or mitigated where effects are unavoidable. Furthermore, the measures detailed in **Sections 8.8** and **8.10** have been designed to achieve 10% BNG, in accordance with the future requirements of the Environment Act 2021 using the Defra biodiversity offsetting metric (now Natural England 3.1) (Ref. 8.2) as another mechanism.

Policy	How and where addressed in ES
ensure that risk of disturbance or damage to species or habitats is minimised (including as a consequence of transport access arrangements); c. *habitats will, where practicable, be restored after construction works have finished;* d. *developments will be designed and landscaped to provide green corridors and minimise habitat fragmentation where reasonable; and* e. *opportunities will be taken to enhance existing habitats and, where practicable, to create new habitats of value within the site landscaping proposals, for example through techniques such as the 'greening' of existing network crossing points, the use of green bridges and the habitat improvement of the network verge."*	
Biodiversity 2020: A strategy for England's wildlife and ecosystem services (Ref. 8.18). This Strategy identifies how climate change is likely to affect the future environment (detailed within **Section 8.12**). It also reflects on how ecological networks will be maintained through the use of a biodiversity offsetting metric and through studies into connectivity through the study area and wider landscape, for particularly sensitive/valuable species.	The Proposed Development includes measures, such as habitat creation, to mitigate effects and contribute to achieving 10% net gain in biodiversity. The Proposed Development's embedded and good practice mitigation measures are detailed within **Section 8.8** and additional mitigation measures are detailed within **Section 8.10**. A BNG strategy is provided within **Appendix 8.5** of the ES **[TR020001/APP/5.02],** consistent with the Biodiversity 2020 strategy.
Luton Local Plan 2011-2031 (adopted November 2017) (Ref. 8.19). The Luton Local Plan (2011–2031) sets out a set of policies, development allocations and actions to meet the environmental, social and economic challenges facing the area over the 20-year plan period. Policy LLP28 - Biodiversity and Nature Conservation states that; "*The Council will work …. to positively assess, manage, and designate sites and*	The biodiversity assessment provides an assessment of the potential effects that the Proposed Development will have on designated nature conservation sites, habitats and species as per the policies listed within the Plan. The Proposed Development applies the mitigation hierarchy identified within the policy. Addressed in **Section 8.9** and **8.14**.

Policy	How and where addressed in ES
ecological networks including giving support to development proposals that add to the net stock of wildlife habitats or where they help to deliver a net gain in the conservation and enhancement of such sites." "*Development proposals that impact adversely on statutory or other designated sites, and ecological networks will need to demonstrate*…. a. avoidance, wherever possible; otherwise…. b. benefits of the proposal must clearly outweigh the intrinsic nature conservation interest …..; c. mitigation must be used, …. and appropriate management to minimise any harm during and after development; and d. compensation, through acquisition and management of an alternative habitat of equivalent wildlife value in the vicinity." "*All existing habitats and ecological networks will be afforded a level of protection from harm according to statutory and non-statutory nature conservation hierarchy designations and the contribution they make to wider ecological networks*." "*Development site layouts should retain any existing areas of National Priority Habitats wherever possible, and to enhance their visual and biodiversity value*."	
Central Bedfordshire Local Plan 2015- 2035 (adopted 2021) (Ref. 8.20). The Central Bedfordshire Local Plan is the key strategic planning document for Central Bedfordshire and guides and supports the delivery of new infrastructure, homes and jobs. It sets out the long-term vision and objectives for the area, what is going to happen, where, and how this will be achieved and delivered over the 20 year plan period. This Central Bedfordshire Council (CBC) Local Plan adopted in July 2021 replaces	The biodiversity assessment provides an assessment of the potential effects that the Proposed Development will have on designated nature conservation sites, habitats and species as per the policies listed within the Plan. The Proposed Development applies the mitigation hierarchy identified within the policy. Addressed in **Section 8.9** and **8.14** and the BNG assessment **Appendix 8.5** of this ES **[TR020001/APP/5.02]**.

Policy	How and where addressed in ES
the North Core Strategy and Development Management Policies Document (2009) and the majority of the remaining policies within the South Bedfordshire Local Plan (2004), the Mid Bedfordshire Local Plan (2005) and the remaining saved policies of the Bedfordshire and Luton Minerals and Waste Local Plan (2005) so far as they affect Central Bedfordshire. Policy EE2: Enhancing Biodiversity states that "*Development proposals will be permitted where they provide a net gain in biodiversity through the conservation, restoration, enhancement and creation of ecological networks of habitats, species and sites …...* *Development proposals will be permitted where they avoid negative impacts on biodiversity ….Where this is not possible, proposals must mitigate unavoidable impacts and, as a last resort, compensate for residual impacts.* *Development proposals within, or in close proximity to, an ecological corridor should enhance the functionality and connectivity of the corridor.* *Development that would impact on the strategic ecological network causing fragmentation or otherwise prejudice its effectiveness will not be permitted*." Policy EE3: Nature Conservation states that: "*Important habitats ….. will be protected, maintained and enhanced*" It states that "*Up to date, comprehensive ecological surveys …will be required to support and inform development proposals…..demonstrating development will deliver a net gain*" Policy EE4: Trees, Woodlands and Hedgerows states that: "*Development Proposals will be permitted where:* a. they do not adversely affect ancient woodland and aged and veteran trees. b. woodlands, including semi-natural woodlands, planted ancient woodland	

Policy	How and where addressed in ES
sites, traditional orchards, hedgerows, and specimen trees found outside woodlands are protected and buffered. c. existing hedgerows and trees are incorporated to enhance developments…… d. any removal of trees or hedgerows to accommodate development is justified, and lost assets are replaced within the development site with appropriate planting…..”	
North Hertfordshire District Council Local Plan for 2011-2031, November 2022 (Ref. 8.21). The North Hertfordshire District Council (NHDC) Local Plan 2011-2031, was adopted on 8 November 2022 and replaces the saved policies of the District Plan Second Review with Alterations. Relevant policies to biodiversity include: Strategic Policy SP12: Green infrastructure, landscape and biodiversity: “*We will accommodate significant growth during the plan period whilst ensuring the natural environment is protected and enhanced. We will;* *Protect, identify, manage and where possible enhance a strategic multi-functional network of green infrastructure.* *Protect, enhance and manage designated sites in accordance with the following hierarchy of designations;* *a. internationally designated sites* *b. nationally designated sites* *c. locally designated sites* *d. non-designated sites that include important habitats and species* *Protect, enhance and manage biodiversity networks including wildlife corridors, ancient woodlands and hedgerows, wetland and riverine habitats, ….protected species, priority species and habitats, and non-designated sites of ecological value*	The biodiversity assessment provides an assessment of the potential effects that the Proposed Development will have on designated nature conservation sites, habitats and species as per the policies listed within the Plan. The Proposed Development applies the mitigation hierarchy identified within the policy. Addressed in **Section 8.8 to 8.11, 8.13 to 8.14** and the BNG assessment **Appendix 8.5** of this ES **[TR020001/APP/5.02]**.

Policy	How and where addressed in ES
and ensure measurable net gains for biodiversity" Policy NE1: Strategic green infrastructure: *Planning permission will be granted provided that development:* a. *Protects, conserves and where possible enhances the strategic green infrastructure network;* b. *Avoids the loss, fragmentation, severance or negative impact on the function of the strategic green infrastructure network;* c. *Creates new strategic green infrastructure where appropriate and is accompanied by a plan for its long-term maintenance and* d. *management; and* e. *Has suitable mitigation measures or appropriate replacement to satisfactorily address adverse impacts on the strategic green infrastructure network."* Policy NE4: Biodiversity and geological sites states that "*planning permissions will only be granted …..that appropriately protect, enhance and manage biodiversity in accordance with the hierarchy and status of designations and features listed in Policy SP12.* *All development should deliver measurable net gains for biodiversity …., contribute to ecological networks and the water environment, and/or restore degraded or isolated habitats where possible.* *Applicants should, having regard to the status of any affected site(s) or feature(s):* a. *Submit an ecological survey that is commensurate to the scale and location of the development and the likely impact on biodiversity, the legal protection or other status of the site;* b. *Demonstrate that adverse effects can be avoided and/or satisfactorily*	

Policy	How and where addressed in ES
minimised having regard to the hierarchy of protection below; *i. locating on an alternative site with a less harmful impact;* *ii. providing adequate mitigation measures; or* *iii. as a last resort compensated for.* *The acceptability of approach(es) to avoidance, mitigation and compensation will be commensurate with the status of the asset(s) …; Compensation is unlikely to be an appropriate solution for proposals affecting nationally or internationally designated sites other than in the most exceptional circumstances.* *c. Include appropriate measures to manage construction impacts by demonstrating how existing wildlife habitats supporting protected or priority species will be retained, safeguarded and managed during construction;* *d. Integrate appropriate buffers of complimentary habitat for designated sites and other connective features, wildlife habitats, priority habitats and species into the ecological mitigation and design. The appropriateness …. having regard to the status of the relevant habitat. 12 metres of complimentary habitat should be provided around wildlife sites..., trees and hedgerows. It may be necessary to exceed ..for fragile habitats such as ancient woodland or to provide appropriate root protection for mature trees; and* *e. Provide a long-term management and monitoring plan including mitigation measures as necessary.*	
Dacorum's Local Planning Framework, Core Strategy 2006-2031, adopted 25 September 2013 (Ref. 8.22).	The biodiversity assessment details how the Proposed Development will conserve and restore habitats and species and will

Policy	How and where addressed in ES
The purpose of the Core Strategy is to anticipate and manage change in Dacorum over the years to 2031. Relevant Policy includes: Policy CS26: Green Infrastructure states that "*The Green Infrastructure Network will be protected, extended and enhanced. Habitat management zones, projects and more detailed policies will be set out in a Supplementary Planning Document and related Action Plan(s). National and local Biodiversity Action Plans will be supported. Designated sites will be protected and opportunities taken to link them with the wider Green Infrastructure Network. Development and management action will contribute towards:* a. *the conservation and restoration of habitats and species;* b. *the strengthening of biodiversity corridors;* c. *the creation of better public access and links through green space; and* d. *a greater range of uses in urban green spaces.* e. *open spaces will be managed in accordance with the Council's Green Space Strategy."*	strengthen biodiversity corridors, as per Policy CS26. Addressed in **Section 8.9** and **8.14** for habitats relevant to the where the Proposed Development falls within Dacorum Borough Council, limited to small areas of habitat alongside the slip road at the Off-site Highways Interventions of Junction 10 of the M1.
Bedfordshire and Luton Local Biodiversity Action Plan (LBAP) (Ref. 8.23). Since 2001 the Bedfordshire and Luton Wildlife Working Group has been developing and maintaining the individual plans for species and habitats as part of this county's Biodiversity Action Plan (BAP). These include, but are not limited to, otter (*Lutra lutra*), water vole (*Arvicola amphibius*), arable field margins, hedgerows and lowland calcareous grassland. This LBAP is listed in the Ecology Baseline Report (**Appendix 8.1** of this ES **[TR020001/APP/5.02]**).	The biodiversity assessment provides an assessment of the potential effects that the Proposed Development will have on habitats and species for which their inclusion within these LBAPs forms part of the rationale for their stated importance. Addressed in **Section 8.9** and **8.14**.

Policy	How and where addressed in ES
Hertfordshire LBAP (Ref. 8.24). The Hertfordshire LBAP sets out a 50 year vision for the wildlife and natural habitats of Hertfordshire and reviews UK priority habitats and species within the local context. The Hertfordshire LBAP identifies 17 Species Action Plans and 7 Habitat Action Plans that guide work on protecting, restoring and re-creating a sustainable level of biodiversity in the county. These include, but are not limited to otter, water vole, Natter's bat (*Myotis nattereri*), woodland, neutral grassland and chalk grassland. This LBAP is listed in the Ecology Baseline Report (**Appendix 8.1**of this ES **[TR020001/APP/5.02]**).	The biodiversity assessment provides an assessment of the potential effects that the Proposed Development will have on habitats and species for which their inclusion within these LBAPs forms part of the rationale for their stated importance. Addressed in **Section 8.9** and **8.14**.
Biodiversity Opportunity Area (BOA). BOA plans identify where the greatest gains for biodiversity could be delivered within a local area. The Rebuilding Biodiversity in South Bedfordshire and Luton (2008) (Ref. 8.25) and Hertfordshire's Ecological Networks: A report on the current situation and priorities for restoration (2018) (Ref. 8.26) plans have been consulted to inform the development of Green Infrastructure as part of the Proposed Development.	The Proposed Development includes measures, such as habitat creation, to mitigate effects and contribute to achieving BNG. This has taken into account the relevant BOA plans. The Proposed Development's embedded and good practice mitigation measures are detailed within **Section 8.8** and additional mitigation measures are detailed within **Section 8.10**.

8.2.3 The Airports National Policy Statement (ANPS) (Ref. 8.27) does not have effect in relation to an application for development consent for an airport development not comprised of an application relating to the Heathrow Northwest Runway. Nevertheless, as set out within paragraph 1.41 of the ANPS, the Secretary of State considers that the contents of the ANPS will be both important and relevant considerations in the determination of such an application, particularly where it relates to London or the south east of England. In particular, the ANPS makes clear that, alongside the provision of a new Northwest Runway at Heathrow, the government supports other airports making best use of their existing runways as set out in Beyond the Horizon: Making best use of existing runways (Ref. 28), which is the specific policy context for this application.

8.2.4 In addition, whilst the ANPS does not have effect in relation to the Proposed Development, it sets out a number of principles for environmental impact assessment and compliance and these will be an important and relevant consideration in the determination of the application for development consent. A summary of the relevant provisions for the biodiversity assessment and how

these have been addressed in relation to ecological receptors in this ES is provided within **Table 8.3**.

Table 8.3: How relevant Biodiversity requirements of the ANPS are addressed in the ES

ANPS Section	How and where addressed in ES
Paragraphs 5.89 – 5.91 set out the requirement for an assessment of likely significant effects upon biodiversity and ecological conservation. The Biodiversity and ecological conservation section promotes a general aim of achieving no net loss to biodiversity. It explains that "*The Government's biodiversity strategy is set out in Biodiversity 2020: A Strategy for England's wildlife and ecosystem services. Its aim is to halt overall biodiversity loss, support healthy, well-functioning ecosystems, and establish coherent ecological networks, with more and better places for nature for the benefit of wildlife and people*." Applicants are also required to show how they have maximised opportunities in respect of conservation.	The likely significant effects of the Proposed Development upon internationally, nationally and locally designated nature conservation sites are detailed within **Section 8.9** and summarised in **Table 8.17**. The construction of the Proposed Development will result in the loss of Wigmore Park County Wildlife Site (CWS) (a hedgerow to the north east will be retained and incorporated into the provision of open space). Additional locally designated nature conservation sites, including Winch Hill Wood CWS/Local Wildlife Site (LWS), Luton Parkway Verges District Wildlife Site (DWS), Dairyborn Scarp DWS and Burnt Wood LWS are located within or in close proximity to the Proposed Development, with loss of areas of Luton Parkway Verges DWS and Dairyborn Scarp DWS. The assessment reflects the principles of Biodiversity 2020: A Strategy for England's wildlife and ecosystem services in identifying how climate change is likely to affect the future environment (detailed within **Section 8.12**). It also reflects how ecological networks will be maintained through the use of a biodiversity metric and through connectivity through the study area and wider landscape, for particularly sensitive/valuable species. The Proposed Development includes measures, such as habitat creation, to mitigate the effects of the Proposed Development and contribute to achieving BNG. The Proposed Development's embedded and good practice mitigation measures are detailed within **Section 8.8** and potential additional mitigation measures are detailed within **Section 8.10**.
Paragraphs 5.92 to 5.95 describe the approach that should be taken to the	The measures detailed within **Sections 8.8** and **8.10** have been designed to ensure

ANPS Section	How and where addressed in ES
incorporation of ecological mitigation measures into an airport development during construction or operation, including addressing the mitigation hierarchy. "*Compensation ratios relating to the effects of the preferred scheme should be considered in more detail during the design. The application of 2:1 compensation ratio is considered to represent the minimum requirement. However, there are other mechanisms for establishing compensation ratios, such as Defra's biodiversity offsetting metric. Equally, it is important to note that habitat ratios form only one part of potential compensation which should be considered, and the location and quality of any compensation land is of key importance. In this regard, habitat creation, where required, should be focused on areas where the most ecological and ecosystems services benefits can be realised*."	that impacts of the Proposed Development on ecological receptors are avoided, reduced or mitigated where effects are unavoidable. Furthermore, the measures detailed in **Sections 8.8** and **8.10** have been designed to achieve 10% BNG, as per the future requirements of the Environment Act 2021 using the Defra biodiversity offsetting metric (now Natural England 3.1) (Ref. 8.2) as another mechanism. Detailed mitigation strategies in relation to badgers, bats and Roman snail (*Helix pomatia*), have been submitted to Natural England, for approval. As detailed within **Section 8.5** a Defra biodiversity offsetting calculation has been undertaken which provides a measurable and transparent method for assessing the value of impacts, mitigation and compensation associated with the Proposed Development. The detailed results of the Defra metric BNG assessment are provided within **Appendix 8.5** of this ES **[TR020001/APP/5.02]**.
Paragraphs 5.96 to 5.104 states the general principle, subject to specific policies, that "*the development should avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives*", and discusses the requirement for the Secretary of State "*to take into account during their decision that appropriate weight has been given to designated sites of international, national and local importance, protected species, habitats and other species of principal importance for the conservation of biodiversity, and to biodiversity and geological interests within the wider environment*". Paragraph 5.104 discuses opportunities for enhancement of biodiversity as part of the design process.	The biodiversity assessment provides an assessment of the potential effects that the Proposed Development will have on designated nature conservation sites, habitats and species as per the policies listed within the Plan. The Proposed Development applies the mitigation hierarchy identified within the policy. Addressed in Section 8.9 and 8.14 and the BNG assessment **Appendix 8.5** of this ES **[TR020001/APP/5.02]**. In addition to the measures described within **Section 8.8** further off-site enhancement measures are proposed within **Section 8.10**, these are further detailed within the Outline LBMP **Appendix 8.2** of this ES **[TR020001/APP/5.02]**.

ANPS Section	How and where addressed in ES
"*The proposed development comprised in the preferred scheme should provide many opportunities for building in beneficial biodiversity as part of good design. When considering proposals, the Secretary of State will consider whether the applicant has maximised such opportunities in and around developments, and particularly to establishing and enhancing green infrastructure*."	

Guidance

Table 8.4: Biodiversity guidance

Legislation	How and where addressed in ES
Office of the Deputy Prime Minister (ODPM) Circular 06/2005 (Ref. 8.29). This Government circular provides guidance on the application of the law relating to planning and nature conservation as it applies in England. This circular remains referenced within the NPPF (footnote 61), where others have been withdrawn.	This circular has been taken into account in the production of this ES. The guidance is relevant to a number of sections of this chapter including **Sections 8.3** and **8.5**.
Chartered Institute of Ecology and Environmental Management (CIEEM) (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland (Ref. 8.30) This provides guidance for Ecological Impact Assessment (EcIA), and aims to promote good practice, promote a rigorous and transparent approach to EcIA, provide a common framework, and provide decision makers with relevant information about the likely ecological effects of a project.	The CIEEM guidance is used as the basis for the assessment and is relevant to a number of sections of this chapter including **Sections 8.3**, **8.5** and **8.9**.
Planning Inspectorate Advice Note Ten: Habitats Regulations Assessment relevant to nationally significant infrastructure projects (V9) (2022) (Ref. 8.31).	This note has been taken into account in the production of this ES. The note is relevant to a number of sections of this chapter including **Sections 8.3** and **8.5** and also within the HRA NSER

Legislation	How and where addressed in ES
This note provides advice for Applicants in relation to the preparation of the Habitats Regulations Assessment, which should accompany applications for NSIPs under the Planning Act 2008, as amended (PA2008), Applicants should consider the potential effects of the application on protected habitats.	(**Appendix 8.3** of this ES **[TR020001/APP/5.08]**).
Civil Aviation Authority (CAA) (2014) Wildlife Hazard Management at Aerodromes. Civil Aviation Publication (CAP) 772 (Ref. 8.32). CAP 772 provides guidance to assist aerodrome operators in establishing and maintaining an effective Bird Control Management Plan (BCMP), including the measures necessary to assess the bird strike risk at the aerodrome, and the identification of appropriate action to minimise that risk.	This guidance has been taken into account in the production of this ES. The guidance is relevant to a number of sections of this chapter including: **Sections 8.3** and **8.5,** but primarily the Bird Strike Risk assessment (**Appendix 8.4** of this ES **[TR020001/APP/5.02]**).

8.3 Scope of the assessment

8.3.1 This section describes the scope of the biodiversity assessment, including how the assessment has responded to the Scoping Opinion. The temporal and spatial scope, the relevant receptors, and matters scoped in and out are identified. A description of engagement undertaken with relevant technical stakeholders to develop and agree this scope is provided in **Section 8.4**.

Scoping Opinion

8.3.2 The EIA Scoping Report set out the proposed scope and assessment methodologies to be employed in the EIA and is provided in **Appendices 1.1 and 1.2** of this ES **[TR020001/APP/5.05]**.

8.3.3 In response to that Scoping Report, a Scoping Opinion was received from the Planning Inspectorate on 9 May 2019 and is provided in **Appendix 1.3** of this ES **[TR020001/APP/5.05]**.

8.3.4 **Table 8.5** describes the main matters highlighted by the Planning Inspectorate in the Scoping Opinion and how these have been addressed in this ES. Responses to all comments received in the Scoping Opinion are provided in **Appendix 1.4** of this ES **[TR020001/APP/5.02]**.

Table 8.5: Biodiversity Scoping Opinion comments

Scoping Opinion ID	Scoping Opinion comment	How this is addressed
4.1.5	The Scoping Report refers to local nature sites that lie within 2km of the Application Site and refers to the biodiversity aspect chapter as providing further detail on these. The ES should provide a full assessment of the air quality impacts on these designated nature conservation sites where significant effects are likely. Where information to support the assessment is to be presented in the biodiversity aspect chapter of the ES, clear cross referencing to the relevant sections of other chapters should be included and, where relevant, supporting plans provided in order to assist the reader.	While there is only a statutory requirement to assess air quality impacts at nationally and internationally designated nature conservation sites, potential air quality impacts (in terms of NOx and nitrogen deposition) at local sites are calculated and fully assessed within **Chapter 7** of this ES **[TR020001/APP/5.01]** and **Section 8.14** of this chapter.
4.3.3	The Applicant should ensure that other consultation bodies with statutory responsibilities for other matters relevant to	Consultation with statutory bodies such as Natural England has been

Scoping Opinion ID	Scoping Opinion comment	How this is addressed
	this aspect assessment (e.g. biodiversity), such as Natural England (NE), are consulted regarding the potential for climate change effects to influence the effectiveness of any proposed mitigation measures.	undertaken as summarised in **Section 8.4**. Meetings included discussions where possible about the potential for climate change effects to influence the effectiveness of any proposed mitigation measures and information gathered has been used to inform the ES.
4.12.1	The Inspectorate considers that indirect impacts could occur on the River Lea, and therefore its flora, fauna and the CWS. Similarly, other watercourses including those which are of conservation concern (e.g. chalk streams) could be affected by the Proposed Development. The ES must assess indirect impacts on watercourses and identify any significant effects on associated habitats, protected species, and other species of conservation concern.	Potential for initial indirect effects on nearby watercourses have been assessed within **Chapter 20** Water Resources and Flood Risk of this ES **[TR020001/APP/5.01]**, and it has been determined that there will be no significant adverse effects. A WFD compliance assessment is provided within **Appendix 20.2** of this ES **[TR020001/APP/5.02]**, and a Hydrological Risk Assessment is provided in **Appendix 20.6** of this ES **[TR020001/APP/5.02]** in line with the EA methodology, to inform the detailed assessment of potential impacts on the upper Lee (or Lea) Chalk WFD waterbody. In relation to protected species surveys, the initial decision to scope them out was made on the basis of the absence of suitable habitats within the Main Application Site. For the sake of completeness surveys have been undertaken on watercourses adjacent to the Proposed Development for their potential to support otter, water vole, white-clawed crayfish (*Austropotamobius pallipes)* and other aquatic invertebrates. Potential direct or indirect effects, as a result of the Proposed Development, have been assessed and presented in **Section 8.9** and **8.14** where applicable.

Scoping Opinion ID	Scoping Opinion comment	How this is addressed
4.12.2	The Inspectorate does not consider that sufficient information has been provided to confidently conclude that no significant effects could occur on hazel dormouse (*Muscardinus avellanarius)* and great crested newt (*Triturus cristatus)*, and therefore cannot agree to scope these matters out of the assessment. Accordingly, the ES should include an assessment of these matters where there is a likely significant effect.	Surveys have been undertaken for hazel dormouse and great crested newt confirming the likely absence of these species. Full methodologies and results for all ecological surveys to date are included within the Ecology Baseline Report within **Appendix 8.1** of this ES **[TR020001/APP/5.02]**, this includes maps illustrating survey extents and findings as appropriate. Discussion of survey results for these species was included within the 2022 Technical Working Group (TWG) meetings with relevant stakeholders, who were not expecting these species to be present within the Proposed Development and agreed with the conclusion of their likely absence.
4.12.3	Notwithstanding the existing paucity of habitats of ecological value (at Off-site Carparks and Highway Interventions) indicated by the Scoping Report, the proposed works could give rise to indirect impacts. The Inspectorate considers that the ecological effects from these works should be assessed in the ES where significant effects could arise and does not agree to scope them out of the ES.	Additional surveys of Off-site Car Park and Highway Intervention areas have been undertaken. Relevant assessment has been undertaken, and potential effects are addressed in **Section 8.9** and **8.14**.
4.12.4	The Scoping Report describes the study area in relation to the Main Application Site. Paragraphs 17.4.9 to 11 describe statutory nature conservation sites, including international nature conservation sites, in relation to the 'Main Application Site'. Table 17.2 lists non-statutory nature conservation sites within 2km of the 'Proposed Development'. The study area must be clearly defined in the	The study area for the assessment is set out within **Section 8.3**, in **Table 8.6** of this chapter. The anticipated geographical extent of impacts and required study area have been assessed for the ES and are presented in **Section 8.3.5**.

Scoping Opinion ID	Scoping Opinion comment	How this is addressed
	ES, and any figures accompanying the ES should also clearly depict the study area applied to the assessment. The study area should be based on the anticipated geographical extent of impacts, and in the case of the Proposed Development this may include consideration of changes to ATMs for air quality and noise effects on ecological receptors.	
4.12.5	The ZoI will be established with regards to the Main Application Area and this should reflect the full extent of the Proposed Development and its likely impacts. The Scoping Report states that the Off-site Car Parks and Off-site Highway Interventions are located in areas of negligible ecological value and are not discussed further in the baseline. The ES should include a robust analysis of the baseline supported by appropriate desk-based analysis and site-specific surveys where necessary.	The anticipated geographical extent of impacts and required study area have been re-assessed for the ES. The study area is set out within **Section 8.3** of this chapter. This includes the Main Application site, and the Off-site Car Parks and Off-site Highways Interventions, which have also been subject to surveys where appropriate, as detailed within the Ecology Baseline Report (**Appendix 8.1** of this ES **[TR020001/APP/5.02]**).
4.12.6	Paragraph 17.6.2 mentions 'a range of further ecological surveys' to be undertaken to inform the ecological impact assessment of the 'Proposed Development'. Paragraphs 17.4.63 to 17.4.69 refer to the Main Application Site. The ES must define the study area applied and provide justification for the geographical extent of the surveys. The assessment should be based on the anticipated extent of the	The anticipated geographical extent of impacts and required study area have been re-assessed for the ES. The study area is defined and justified within **Section 8.3** of this chapter. This includes the Main Application site, and the Off-site Car Parks and Off-site Highways Interventions, which have also been subject to surveys where appropriate, as detailed within the Ecology Baseline Report (**Appendix 8.1** of this ES **[TR020001/APP/5.02]**).

Scoping Opinion ID	Scoping Opinion comment	How this is addressed
	impacts of the Proposed Development.	
4.12.7	The Scoping Report indicates that impacts to breeding birds will be assessed; however, there is no further information regarding the intended breeding bird surveys. For clarity, the Inspectorate consider these surveys are necessary to inform the assessment. The ES must describe all the survey works and data gathering which form the basis for the assessment.	The study area for breeding bird surveys is set out within **Section 8.3**, **Table 8.6** of this chapter, with methodology presented in **Section 8.4** and the Ecology Baseline Report (**Appendix 8.1** of this ES **[TR020001/APP/5.02]**). The results of these surveys informed the assessment and potential effects are addressed in **Section 8.9** and **8.14**.
4.12.8	Figure 17.2 (non-statutory designated sites) does not depict all of the sites listed in Table 17-2 as stated by the Scoping Report. Any figures presented in the ES should be complete and at an appropriate scale to illustrate the relevant baseline information. The joint response from HCC, North Hertfordshire District Council (NHDC), CBC and LBC highlights three CWS under consideration by NE as Sites of Special Scientific Interest (SSSIs), along with other information about the presence and nature of other non-statutory and statutory sites which may be affected by the Proposed Development. The Applicant is advised to consult with the local authorities to ensure accurate information about sites of ecological value is taken into account in the assessment.	**Figure 8.2** Non-Statutory Designated Sites of this ES **[TR020001/APP/5.03]** includes all relevant nature conservation sites discussed within this assessment and the Ecology Baseline Report (**Appendix 8.1** of this ES **[TR020001/APP/5.02]**). Discussion during the TWG meetings with the local councils included non-statutory sites where relevant. Two of the three nature conservation sites discussed as being under consideration as SSSIs have now become SSSIs and are assessed as such. These are now presented on **Figure 8.1** Statutory Designated Sites of this ES **[TR020001/APP/5.03]**.
4.12.9	Paragraph 17.5.3 of the Scoping Report states that a significant effect at a national level would be a material	The methodology for assessment within this assessment is presented in **Section 8.5**. The assessment follows a consistent methodology in line with

Scoping Opinion ID	Scoping Opinion comment	How this is addressed
	consideration for a NSIP, and that significant effects at district level should be a material consideration for district planning applications. The Inspectorate advises that the purpose of the ES is to assess and present the likely significant environmental effects resulting from the Proposed Development. The ES assessment methodology should avoid conflating issues between the assessment of significant effects and the weight that may or may not be afforded to the assessment in the decision-making process. The statement in Paragraph 17.5.3 does not align with the methodology for determining significance presented in Section 5.3 and Paragraphs 17.5.8 to 17.5.11 of the Scoping Report, and for clarity, the Inspectorate requests that a consistent methodology is applied in the ES.	the principles of the CIEEM guidance on Ecological Impact Assessment (2018) (Ref. 8.30) and does not refer to weight of significant effects afforded in the decision making process.
4.12.10	Advice on mitigation is provided in Section 3 of this Scoping Opinion, and similar advice applies to measures proposed for the purposes of environmental enhancement. Measures to be provided to mitigate impacts predicted through the EIA process should be clearly stated in the ES and secured in the DCO, as appropriate. The ES should clearly identify significant effects that are to be mitigated and those that are to be included as part of a biodiversity net gain metric. The Inspectorate notes from	Potential significant effects are addressed in **Section 8.9, Section 8.11** and **8.14**. Mitigation measures are set out in **Section 8.8** of this chapter for embedded and good practice measures, and **Section 8.10** for additional mitigation required. The measures to establish, manage and monitor areas of habitat creation within the Proposed Development are detailed within the Outline LBMP, which is provided as **Appendix 8.2**, of the ES **[TR020001/APP/5.02]**. BNG has been provided as per the BNG report **Appendix 8.5** of the ES **[TR020001/APP/5.02].**

Scoping Opinion ID	Scoping Opinion comment	How this is addressed
	Paragraph 17.8.2 the intention to submit a Landscape and Biodiversity Management Plan as part of the ES and advises that this should accord with the assessment of residual effects.	
4.12.11	The Applicant should consider whether the proposed mitigation and enhancement has the potential to increase bird-strike risk. Design of new wetland habitats, such as through the drainage strategies, should minimise their attractiveness to species of birds hazardous to air traffic.	With the exception of a small cluster of very small ponds within the Habitat Creation area to the east of the Main Application site, the Proposed Development does not include the provision of surface waterbodies. The landscape scheme for the Proposed Development has been designed to include management measures to avoid any significant increase in bird strike risk, as reported in the Bird Strike Risk Assessment (**Appendix 8.4** of this ES **[TR020001/APP/5.02]**).
4.12.12	The Inspectorate notes the reference to a lighting assessment and expects that this information will be applied to the biodiversity assessment. Lighting impacts on birds are mentioned in relation to the operation of the Proposed Development but not for the construction. The Inspectorate considers that impacts from lighting during construction should be assessed in the ES where significant effects are likely to occur. The Inspectorate considers that lighting impacts could result from the Off-site Car Park and Highways Proposals and advises that any likely significant effects should be assessed in the ES.	An assessment of lighting impacts upon all sensitive ecological receptors, including Off-site Car Park and Highways Interventions where appropriate, during both the construction and operational of the Proposed Development, is included, and potential effects are addressed in **Section 8.9** and **8.14**.
4.12.13	The ES should consider any likely significant effects associated with increased recreational pressure on ecological features/sites of	This assessment has determined any likely effects associated with increased recreational pressure on the ecological features/sites of importance, and the results of

Scoping Opinion ID	Scoping Opinion comment	How this is addressed
	importance as a result of displaced users of existing green space to be lost to/affected by the Proposed Development, notably Wigmore Park CWS. The ES should include appropriate cross-reference to other relevant aspect chapter assessments in this regard, including the Health and Community and Landscape and Visual aspect chapters, which are proposed to include assessment of effects to open space and users.	significance are provided in **Section 8.9** and summarised in **Section 8.14**. Mitigation, where necessary is stated within **Section 8.8** and **Section 8.10**. Cross referencing to other chapter assessments is provided where appropriate.
4.16.7	The proposed 1.5km ZoI is not justified in the Scoping Report but appears to be based on potential effects on species. It is not clear why the ZoI set within the Biodiversity chapter (Chapter 17) has not been applied, which extends up to 10km for statutory designated sites (up to 30km for those designated for bat and bird species). At 1.5km the cumulative ZoI is likely to omit consideration of cumulative effects on designated sites in the wider area. The Inspectorate advises that the ZoI should reflect that proposed in the Biodiversity assessment.	Cumulative impacts on biodiversity are considered (where applicable - i.e. where potential impact pathways (routes by which a change in activity can lead to an effect) are present to receptors) in relation to all ZOIs listed in the biodiversity chapter (including those for statutory and non-statutory designated nature conservation sites).There are no SACs, SPAs or Ramsar sites within 10km, none relating to bats within 30km, and although there are for birds over 23km, there is no functionally linked land present within the site. There are SSSIs within 5km which will not be affected. In the absence of statutory designated sites within their study areas or having potential pathways for effect resulting in a biophysical change, a reduced ZOI was considered appropriate, previously stated to be 1.5km. The ZOI for the Proposed Development has been increased from 1.5km to 2km as a result of the air quality assessment. The 1.5km previously used was the maximum ZOI for a mobile ecological receptor, in this case barn owl/red kite, that could reasonably be considered

Scoping Opinion ID	Scoping Opinion comment	How this is addressed
		to be impacted by the Proposed Development. However, the detailed air quality assessment has reported some impacts on locally designated ecological sites, therefore, the ZOI has been extended to the non-statutory designated nature conservation sites study area of 2km from the Main Application Site. This is a result of air quality effects on ecological sites only which employs traffic data and is therefore inherently cumulative. This is discussed further in **Sections 8.3.5 to 8.3.12** of this chapter.
Chilterns Conservation Board	The Chilterns Beechwoods Special Area of Conservation (SAC) is in close proximity to motorways and major roads which are likely to experience increased traffic from the expansion of Luton Airport. The Aston Rowant SAC is possibly the only SAC in the UK, which is actually severed by a motorway, with the vast cutting of the M40 motorway constructed through this nature reserve in the 1960s. The M25 also cuts through the Chilterns through the AONB. Increased traffic for Luton Airport could have an effect on air quality, noise and habitats. Air pollution and effects on sensitive habitats and protected nature conservation sites of national and international importance must be carefully addressed through Environmental Impact Assessment and Habitat Regulations Assessment.	An assessment of the effect of construction traffic related NOx concentrations is provided within **Chapter 7** of this ES **[TR020001/APP/5.01]**. An assessment of nitrogen deposition impacts upon those relevant designated nature conservation sites that are sensitive to changes in air pollution such as NOx. has been made within the HRA NSER, provided as **Appendix 8.3** of this ES **[TR020001/APP/5.08]**. Given the separation distance between the Proposed Development and the Sites raised in the comments (Chilterns Beechwoods SAC and Aston Rowant SAC), and the fact they do not lie on the ARN (as defined in **Chapter 7** of this ES **[TR020001/APP/5.01])** for the Proposed Development, no pathways for effect have been identified. This has included consideration of potential air quality changes and associated deposition of air-borne pollutants from aircraft arriving and departing the airport and vehicle emissions resulting from an increase in road traffic

Scoping Opinion ID	Scoping Opinion comment	How this is addressed
		travelling to and from the Proposed Development.

Spatial scope

Study and survey areas

8.3.5 Study and survey areas have been established in accordance with standard best practice methodology including CIEEM. Definitions of the Proposed Development, Application Site and Main Application Site can be found in **Chapter 2** of this ES **[TR020001/APP/5.01]**. The following study and survey areas for biodiversity receptors have been adopted for the purposes of this assessment, with further details provided within the Ecology Baseline Report (**Appendix 8.1** of this ES **[TR020001/APP/5.02]**):

a. statutory designated nature conservation sites within a 10km study area of the Main Application Site (within 30km for those designated for bat species or where relevant for bird species) (**Figure 8.1 [TR020001/APP/5.03]**);

b. non-statutory designated nature conservation sites within a 2km study area of the Main Application Site (**Figure 8.2 [TR020001/APP/5.03]**);

c. section 41 of the NERC Act 2006 priority habitats within a study area covering the Main Application Site;

d. protected and notable species data gathered within a 2km study area of the Main Application Site; and

e. protected and notable species survey areas:

   i. badger within the Main Application Site, including mitigation areas, but excluding Off-site Highways Interventions due to lack of suitable habitat, with the exception of Junction 10 of the M1, plus additional areas of territory mapping extended to 500m east of the Main Application Site;
   ii. bats and hazel dormouse (within appropriate habitats) within the Main Application Site, including mitigation areas, but excluding Off-site Highways Interventions due to lack of suitable habitat;
   iii. riparian mammal surveys were undertaken up to 250m either side of Off-site Highway Intervention works where they cross watercourses, along accessible and suitable habitats, with the exception of the River Lea where a survey of at 1km of bank to the south was conducted, and 50m north due to lack of suitability in this direction;
   iv. reptiles, Roman snail, terrestrial invertebrates and other notable mammals within the Main Application Site;
   v. great crested newt and other amphibians in waterbodies within 500m of the Main Application Site;
   vi. breeding and wintering birds within 500m of the Main Application Site;

vii. barn owl (*Tyto alba)* and red kite (*Milvus milvus)* within 1.5km of the Main Application Site; and

viii. phase 1 habitat surveys and hedgerow assessments have been undertaken on habitats within or directly adjacent to the Main Application Site boundary, with walkover surveys conducted on Off-site Car Parks and Off-site Highways Interventions (with the exception of the proposed highways intervention works at Junction 10 of the M1, where vegetation clearance would be required).

Zone of influence

8.3.6 To establish whether the Proposed Development will result in a significant effect it is important to establish the 'zone of influence (ZOI)' for the Proposed Development. CIEEM defines ZOI as '*the area over which ecological features may be affected by biophysical changes as a result of the proposed project and associated activities'.* The ZOIs differ depending on the ecological feature being considered and the type of biophysical changes that occur as a result of the Proposed Development.

8.3.7 The following are examples of potential effects as a result of biophysical changes associated with the construction and operation of the Proposed Development:

a. direct loss of habitats and associated fauna due to site clearance for the project land take requirements;

b. disturbance and displacement of fauna as a result of increased noise pollution, light pollution and vibration;

c. degradation of habitats as a result of hydrological changes associated with earthworks and changes in land use;

d. fragmentation of habitats and breakdown of ecological connectivity as a result of habitat loss, degradation and disturbance;

e. degradation of habitats and/or injurious effects on species as a result of pollution events (such as release of dust, sediment and chemicals);

f. habitat degradation as a result of the spread of invasive species;

g. degradation of habitats and species as a result of changes in air quality associated with increased emissions;

h. direct killing or injury to flora as a result of collision with aircraft or land vehicle movements; and

i. degradation of habitats and disturbance to species as a result of increased recreational pressures due to changes in people, and associated pet, footfall within the Proposed Development.

8.3.8 The avoidance of potential effects through implementation of good practice avoidance measures such as those described within the Code of Construction Practice (CoCP)(e.g. control measures for dust suppression) (**Appendix 4.2** of this ES **[TR020001/APP/5.02]**) have been taken into account during the determination of the ZOI for ecological features and biophysical changes.

8.3.9 The ZOI of habitats and sedentary species lost to site clearance for construction are easiest to define as they should be restricted to the footprint of the Proposed Development. However, for those biophysical changes that can extend beyond the boundary of the Proposed Development, the ZOI has been determined by the nature of the biophysical change and the sensitivity to this change of the ecological feature in question. For example, a badger may be subject to disturbance from light pollution only, such as sudden increases in light, if directly adjacent to their sett or foraging site, whereas bats may be subject to disturbance and certain species, but not all, may actively avoid habitats subject to light pollution over a much wider area.

8.3.10 Taking account of this, the extent of the ZOI beyond the boundary of the Proposed Development was determined based on professional judgement, with reference to published data relating to the sensitivity of specific ecological features, and in consultation with other environmental technical specialists (i.e. air quality and water). This is broadly reflected within the study area for each receptor type listed above, to the extent at which the desk study and surveys have been conducted to. The ZOI for each ecological feature scoped into the assessment, the broad potential biophysical changes and potential effects upon these ecological features are summarised within **Table 8.6** and associated ZOI for each ecological feature scoped into the assessment.

8.3.11 The study areas described within **Section 8.3.5** are considered representative of the ZOIs for those receptors identified as important ecological features within this ES. **Table 8.6** lists the relevant ZOIs for the Proposed Development. There are no SACs, Special Protection Areas (SPAs), Ramsar sites present within 10km of the Proposed Development, or 30km which are designated for bat species. Lee Valley SPA/Ramsar Site are present at approximately 24km and are designated for bird species, however there is no suitable habitat within 2km of the Proposed Development that is known to regularly support important populations of the relevant species, nor were the relevant species noted to be present within the Main Application Site and 500m survey buffer, during the bird surveys undertaken for the Proposed Development (Ecological Baseline Report, **Appendix 8.1** of this ES **[TR020001/APP/5.02]**). These sites have therefore been screened out as part of the HRA NSER, provided as **Appendix 8.3** of this ES **[TR020001/APP/5.08]**, and are not relevant when considering a ZOI for the Proposed Development.

Table 8.6: ZOIs for ecological features considered of relevance to the assessment, biophysical changes and associated potential effects

Ecological feature	Biophysical change	Potential effect	ZOI
SACs, SPAs, Ramsar sites	Indirect effects	Habitat loss or degradation / disturbance to associated species using functionally linked land	None are present within 10km of the Main Application Site, or 30km for bat species. No bird related site within 30km would be

Ecological feature	Biophysical change	Potential effect	ZOI
			affected in relation to functionally linked land. No effects will occur to receptors in this ZoI and therefore this ZoI is not discussed further.
SACs, SPAs, SSSIs, Ramsar sites, National Nature Reserves (NNRs), Local Nature Reserves (LNRs)	Site clearance/ indirect effects	Habitat loss or degradation / Disturbance to associated species	Four SSSIs (one of which is also an LNR) are present within 5km, the closest being 2.9km and designated for its habitats. No sites within 5km are hydrologically connected. No effects will occur to receptors in this ZoI and therefore this ZoI is not discussed further.
SACs, SPAs, Ramsar sites, SSSIs, NNRs, LNRs	Changes in air quality	Degradation/loss of flora and fauna	Within 5km of the Main Application Site, and 200m of Affected Road Network (ARN) , refer to **Chapter 7** of this ES **[TR020001/APP/5.01].** No effects will occur to receptors in this ZoI and therefore this ZoI is not discussed further.
CWS/LWS/DWS	Site clearance	Habitat loss or degradation	Within the Main Application Site only
CWS/LWS/DWS	Fragmentation of habitats	Reduction in ecological connectivity for flora/fauna that form the designation	Within the Main Application Site only
CWS/LWS/DWS	Hydrological changes/ indirect effects	Degradation of the habitat due to changes to hydrology/pollution/ dust/shading/	Within the Main Application Site only and downstream where relevant

Ecological feature	Biophysical change	Potential effect	ZOI
		recreational pressures	
CWS/LWS/DWS	Changes in air quality	Degradation/loss of flora and fauna	Within 2km of the Main Application Site and 200m of ARN, refer to **Chapter 7** of this ES **[TR020001/APP/5.01]**
Ancient woodland/broadleaved semi-natural woodland/ broadleaved plantation woodland/Ancient and veteran trees	Site clearance	Habitat loss or degradation	Within the Main Application Site only
Ancient woodland/broadleaved semi-natural woodland/ broadleaved plantation woodland	Fragmentation of habitats	Reduction in ecological connectivity for flora/fauna that use the habitat	Within the Main Application Site only
Ancient woodland/broadleaved semi-natural woodland/ broadleaved plantation woodland	Hydrological changes/ indirect effects	Degradation of the habitat due to changes to hydrology/pollution/ dust/recreational pressures	Within the Main Application Site only
Ancient woodland and Ancient and veteran trees	Changes in air quality	Degradation/loss of flora and fauna	Within 2km of the Main Application Site and 200m of ARN, refer to **Chapter 7** of this ES **[TR020001/APP/5.01]**
Species-rich hedgerow	Fragmentation of habitats	Reduction in ecological connectivity for flora/fauna that use the habitat	Within the Main Application Site and connected hedgerows
Semi-improved neutral grassland/semi-improved calcareous grassland/ arable/orchids/arable plants/scrub/ponds/species-rich hedgerow	Site clearance	Habitat loss or degradation	Within the Main Application Site only plus Junction 10 of the M1
Semi-improved neutral grassland/semi-improved calcareous grassland/	Fragmentation of habitats	Reduction in ecological connectivity for	Within the Main Application Site only

Ecological feature	Biophysical change	Potential effect	ZOI
arable/orchids/arable plants/scrub/ponds		flora/fauna that use the habitat	
Semi-improved neutral grassland/semi-improved calcareous grassland/ arable/orchids/arable plants/scrub/ponds	Hydrological changes/ indirect effects	Degradation of the habitat due to changes to hydrology/pollution/ dust/recreational pressures	Within the Main Application Site only
Invasive species	Site clearance	Spread of Invasive Non-Native Species (INNS)	Within the Main Application Site only
Badger/bats/other mammals (brown hare, hedgehog) /reptiles/amphibians/ breeding birds/wintering birds/Roman snail/other invertebrates	Site clearance	Risk or harm/injury	Within the Main Application Site only
Badger/bats/other mammals (brown hare, hedgehog)/ reptiles/amphibians/ breeding birds/wintering birds/Roman snail/other invertebrates	Site clearance	Habitat loss or degradation and fragmentation	Within the Main Application Site and connected habitats
Badger/bats/breeding birds/wintering birds	Increase in noise, vibration and lighting	Disturbance of fauna using habitats	Within the Main Application Site and suitable habitat within 100m
Other mammals (brown hare, hedgehog) /reptiles/amphibians/Roman snail/other invertebrates	Increase in noise, vibration and lighting	Disturbance of fauna using habitats	Within the Main Application Site only
Riparian mammals	Changes in water quality	Degradation/loss of habitat	Within 250m of the Main Application Site and Off-site Highways Interventions where applicable
Schedule 1 birds	Site clearance	Habitat loss or degradation	Within the Main Application Site
Schedule 1 birds	Increase in noise, vibration	Disturbance of fauna using habitats	Within 1.5km of the Main Application Site

Ecological feature	Biophysical change	Potential effect	ZOI
	and lighting		

8.3.12 For the purposes of the cumulative assessment, and in the absence of statutory designated sites within their study area or potential pathway for effect resulting in a biophysical change, a ZOI of 2km is considered appropriate to include non-statutory designated nature conservation sites due to the identification of potential effects from air quality impacts resulting from the Proposed Development. However, this change relates to air quality effects on ecological sites only. The air quality assessment (**Chapter 7** of this ES **[TR020001/APP/5.01]**) employs traffic data which includes other developments and is therefore inherently cumulative. The ZOI for otters can be considered as over 20km based on the reported home range of otters depending on the sex, status and habitat quality (sometimes even 30km to 50km) (Ref 8.33), however given that the Proposed Development does not directly impact upon watercourses there are no pathways to an effect at such a distance. The full cumulative effects assessment is provided in **Chapter 21** of this ES **[TR020001/APP/5.01]**.

Temporal Scope

8.3.13 The Proposed Development will be delivered incrementally to meet forecast passenger demand, during which construction and operation may take place simultaneously. For the purposes of assessment, three assessment phases are considered as described in **Chapter 5** of this ES **[TR020001/APP/5.01]**.

8.3.14 The biodiversity assessment considers the construction impacts and the operational impacts occurring in each assessment phase in turn (assessment Phase 1, Phase 2a and Phase 2b as described in **Table 5.3**), on each receptor with incremental effects, for example vegetation clearance within each assessment phase.

Receptors

8.3.15 The sensitive receptors for the biodiversity assessment are:

a. designated nature conservation sites;
b. important habitats including section 41 priority habitats (Ref. 8.1);
c. protected species; and
d. notable flora and fauna.

8.3.16 These receptors are described further in **Section 8.7** baseline conditions and discussed within **Section 8.4** where this has been agreed through stakeholder engagement.

Matters scoped in

8.3.17 The EIA Scoping Report set out the proposed scope for the assessment of biodiversity. In summary, the following ecological features are scoped in for assessment; designated nature conservation sites, arable and field margins, grassland (neutral and calcareous), hedgerows, scrub, waterbodies, woodland (ancient, semi-natural, and broadleaved plantation), badger, bats, otter (in relation to the River Lea adjacent to Off-site Highways Interventions only), birds (breeding, wintering, barn owl and red kite), hazel dormouse, amphibian species, reptiles, Roman snail and other terrestrial invertebrates.

8.3.18 Due to the absence of watercourses within, or directly adjacent to, the Main Application Site, impacts upon riparian species such as otter, water vole and white-clawed crayfish were scoped out in the scoping report. Subsequent surveys for riparian mammals on the watercourses adjacent to areas of Off-site Highways Interventions in the Luton and Hitchin areas identified the presence of otter on the River Lea, but no confirmed water voles or white clawed crayfish. A single potential water vole burrow was found on the River Lea, but in the absence of other field signs it is considered too ambiguous to confirm presence, however the citation for the River Lea CWS mentions water voles, and the Bedfordshire and Luton LBAP for water voles lists the River Lea as a key area. Therefore riparian mammals are only scoped in for indirect effects on the River Lea and white clawed crayfish not considered further.

8.3.19 The works associated with the Off-site Car Parks and Off-site Highway Interventions were scoped out in the scoping report due to being undertaken within existing areas of hard standing with negligible ecological value. These have since been subject to a walkover assessment to confirm this, and further appropriate surveys were only required on Junction 10 of the M1 where vegetation clearance would be required.

Matters scoped out

8.3.20 Minor habitats such as amenity grassland as well as mixed and coniferous plantation, tall ruderal, marshy grassland and bracken (*Pteridium aquilinum*) are not considered within this assessment due their limited value and/or presence within the ZOI. Marshy grassland was only noted to be present in one small area of the western side of Wigmore Park in an area 10x10m^2.

8.4 Stakeholder engagement and consultation

8.4.1 Engagement in relation to biodiversity has been undertaken with a number of prescribed and non-prescribed stakeholders. Engagement has taken the form of meetings/workshops, correspondence (including provision of draft technical documents for comments/discussion) and site visits. **Table 8.7** below provides a summary of engagement with relevant stakeholders undertaken to inform the EIA. A discretionary advice service (DAS) request was submitted to and agreed with Natural England in February 2018 as a mechanism to engage with Natural England at stakeholder meetings.

8.4.2 For biodiversity, a TWG was formed comprising representatives from the following, with the dates and summary of the discussions presented in **Table 8.7**:

a. Natural England (NE);
b. Luton Borough Council (LBC);
c. Central Bedfordshire Council (CBC);
d. North Hertfordshire District Council (NHDC)/Hertfordshire County Council (HCC);
e. Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire (WTBCN); and
f. Herts and Middlesex Wildlife Trust (HMWT).

8.4.3 The **Consultation Report [TR020001/APP/6.01]** and its appendices **[TR020001/APP/6.02]** submitted as part of the application for development consent contain a full account of the previous statutory consultation process and issues raised in feedback. Matters raised regarding the scope, method, mitigation or compensation being considered as part of the biodiversity assessment were then subject to further discussions directly with stakeholders during working group meetings. The main matters/themes raised during consultation considered relevant to the biodiversity assessment were:

a. potential effects on designated nature conservation sites, habitats and species;
b. potential upgrade of three CWSs to SSSI and assessment of these sites as SSSIs;
c. managing the risk of bird strike;
d. assessing the watercourses for riparian mammals;
e. biodiversity net gain; and
f. statements of common ground.

8.4.4 **Table 8.7** provides a summary of engagement with relevant stakeholders, undertaken to inform the EIA and this ES, including the date and time of meetings and a summary of discussions to resolve matters raised.

Table 8.7: Stakeholder engagement relating to biodiversity

Meeting name and date	Attendees (organisation)	Summary of discussion
Biodiversity Technical Working Group Meeting 1 - 06.04.2018	LBC, HCC and CBC. NE were unable to attend.	Introduction to the Proposed Development and agreement on details of the proposed scope of habitat and species surveys being undertaken and methodologies used. General agreement that dormouse is absent but needs surveying.
Biodiversity Technical Working Group Meeting 2 - 20.11.2018	LBC, HCC, HMWT and WTBCN. CBC and NE were unable to attend.	Discussion on how the design evolved through assessment of design options by environmental disciplines, sharing of the emerging 'preferred option', summary of non-statutory consultation results and survey results and an early indication of likely mitigation measures. Discussion on bird strike risk assessment requirements and agree to include red kite and buzzard (*Buteo buteo*). To consider translocating invertebrates and not just their habitats.
Future LuToN LVIA and Ecology Pre-Scoping Meeting - 26.02.2019	LBC, HCC, CBC, HMWT and WTBCN. NE were unable to attend.	Provided update on ongoing landscape and ecology assessment work and associated methodologies. Discussion on Preferred Option Draft Layout and engineering requirements. Discussion on non-statutory consultation feedback followed by an accompanied site visit.
Future LuToN Landscape and Ecology Meeting 20.05.2019	LLAOL	Discussions about proposed landscape and ecological mitigation measures and their interaction with airside operations. The focus of the conversation was the risk of potential bird-strike and managing this risk throughout construction and operation of the Proposed Development.
Biodiversity Technical Working Group Meeting 3 – 24.06.2019	LBC, HCC, CBC and WTBCN. HMWT and NE were unable to attend.	Discussion about Planning Inspectorate responses to the EIA Scoping Report and proposed surveys and assessment to be contained within the ES. Current landscape proposals were also discussed, and feedback given.
Biodiversity Technical Working Group Meeting 4	HCC, CBC, WTBCN, HMWT and NE. LBC were	Overview of project provided to bring NE up to speed. Discussion on land ownership of wider hedgerow network, clarified that the Applicant will seek to provide enhancements through landowner agreement or acquire rights through DCO.

Meeting name and date	Attendees (organisation)	Summary of discussion
– 18.02.2020	unable to attend.	Query raised on provision of only one pond; requested to explore the option of providing a small cluster of ponds instead. Confirmed intention of commencing habitat creation as early as possible. BNG discussed, including the use of the spatial tool, difficulties regarding habitat type and condition. Mitigation strategies were discussed and it was agreed to use NE's Discretionary Advice Service (DAS). Agreed further territory mapping for badgers to inform potential new sett location. Discussed bird mitigation restrictions regarding strike issue. Agreed to treat red kite as a Schedule 1 species. Agreed to update certain surveys and confirmed riparian mammal results.
Biodiversity Technical Working Group Meeting 5 07.06.2022	LBC, CBC, HCC, HMWT, LLAOL, NE	Provided a project overview of previous stages followed by current programme and Proposed Development including key changes. Discussed timings and there now being 7-8 years of growth from assessment Phase 1 planting before assessment Phase 2a. Overview of surveys conducted and those to be updated given. Query raised regarding desk study data and was confirmed this was being updated for ES. Query raised if barn owl and red kite surveys being updated, and was agreed that red kite would be picked up during the breeding bird surveys but barn owl would not. It was confirmed that barn owls were not found previously on site and that no further pre-submission surveys would be done, but pre-construction surveys would show any changes. No other queries were raised relating to the survey validity, general agreement that pre-construction surveys are needed for a variety of species. Further consultation responses were outlined on how they would be addressed, including more information on the study area, the air quality study being updated with nitrogen deposition, confirmation that Winch Hill ancient woodland would only lose trees noted in the Arboricultural report as requiring removal for health of the woodland/trees and no area of the woodland would be lost. No queries or concerns were raised on these points. The BNG approach was outlined and confirmed to use Defra Metric 3.1, using a cumulative approach and takes into account advanced planting for assessment Phase 2, and only covers affected areas and not the whole red line

Meeting name and date	Attendees (organisation)	Summary of discussion
		boundary as large areas are unaffected. Presented a summary of the landscape planting mitigation and clarified that grassland will be similar to existing LWS. Discussed the aims of creating lowland meadow despite time to create but to be reclassed as other neutral grassland if does not meet criteria (gaining more credits). Confirmed aim to use mix of cutting and low intensity grazing. Stated that long term management will be used to create habitats to gain correct condition required by BNG, and enhancement to improve woodland through removal of conifers, along with other opportunities being considered. Request to see condition assessments and show working was made and use assessors comments in metric. Confirmed producing a BNG report with as much detail as possible regarding comments. Requested clarification on long term management and who owned land. Confirmed the Applicant owns all land for habitat creation which will be managed for 50 years, with initial 5 years review periods for 15 years. Query if natural regeneration of trees is possible, confirmed that was being considered where possible.
Biodiversity Technical Working Group Meeting 6 12.09.2022	LBC, CBC, WTBCN, HMWT, LLAOL,	Provided update on Proposed Development and ongoing ecology assessment work and associated methodologies. Provided overview of each assessment Phase. Provided short response to main statutory consultation feedback points including: a. climate change resilience - no comments received on response; b. validity of survey data - discussion on presence of slow worm (*Anguis fragilis*) with LBC but response on key factor being pre-construction surveys alleviated concerns; c. air quality assessment including that the nearest SAC (Chilterns) remains beyond the distance for requirements for air quality assessments so would not be affected – no comments received; d. ancient woodland – confirmed that no areas of Winch Hill Wood ancient woodland would be lost, only management on the periphery due to arboricultural reasons is required. No ancient or veteran tree would be lost, the only veteran tree directly affected would be coppiced and moved to a suitable location. No comments received.

Meeting name and date	Attendees (organisation)	Summary of discussion
		Discussion outlining the BNG results (BNG data was circulated prior to the meeting). Confirmed that the BNG calculation would be rerun prior to assessment Phase 2a following monitoring. LBC raised issue of soil in Wigmore Park creating diversity of the grassland there. Responded that the Applicant is limited on ability to place soil especially from the landfill. Agreed that appropriate management is key for creating diversity of grassland. Request made for inclusion of beetle banks/bunds. Request for statement of common ground with WT was taken away from the meeting and response that they would not be entering into one with the Applicant. Query raised by LBC over whether any loss of woodland in Dairyborn Scarp, and to be recognised, clarified that may be partial loss on edge where overhangs the Proposed Development but point taken away and to be addressed within the ES.
Mitigation meeting with Natural England 27.09.2022	NE	Provided update on Proposed Development and ongoing ecology assessment work and associated methodologies for NE (due to different people attending than previous meetings). Provided overview of each assessment Phase for NE. Provided short response to main NE statutory consultation feedback and outlined the BNG results. Discussed survey results and proposed mitigation for badger, bats and Roman snail, NE confirmed that they would be happy to review the Mitigation Strategies for these protected species and provide comment in order to work towards provision of letters of no impediment. Discussed potential for provision of statements of common ground – NE confirmed that it was common for them to do so and would confirm after the meeting if they would.

8.5 Methodology

Overview

8.5.1 This section outlines the methodology employed for assessing the likely significant effects on biodiversity from the construction and operation of the Proposed Development, the details of which are described in **Chapter 4** of this ES **[TR020001/APP/5.01]**. Full details of the methodology, including relevant assumptions and limitations, can be found in the Ecology Baseline Report (**Appendix 8.1** of this ES **[TR020001/APP/5.02]**).

Baseline methodology

Desk study

8.5.2 The biodiversity baseline data gathering exercise has focussed upon assembling information on international, national and local designated nature conservation sites and protected and notable habitats and species which fall within appropriate study and survey areas, as defined in **Section 8.3.5**. The following sources have been accessed:

a. Bedfordshire and Luton Biodiversity Recording and Monitoring Centre (BLBRMC) (February 2108, November 2020 and June 2022);

b. Herts Environmental Records Centre (HERC) (February 2108, November 2020 and June 2022);

c. Multi-Agency Geographic Information for the Countryside (MAGIC) database interactive mapping tool (updated August 2022);

d. aerial photography as a scale of 1:25,000; and

e. Ordnance Survey mapping (at scales of 1:50,000 and 1:25,000).

Field Surveys

8.5.3 Ecological data gathering has been ongoing at the site of the Proposed Development for several years; this includes specific surveys for protected and notable habitats and species as summarised in **Table 8.8** below.

Table 8.8: Protected and notable species surveys

Survey type	Recommended survey period	Relevant survey guidance	Survey coverage	Survey period
Phase 1 habitat	April – September (optimal period)	JNCC Handbook for Phase 1 habitat survey (Ref. 8.34)	Main Application Site, and Off-site car parks (all 2018/19/20/22) Off-site Highways Interventions (walkovers only except for M1 J10) (Aug/Sept 2020).	May 2018 – June 2018, May 2019, and November 2019. May 2020 to September 2020. June to July 2022 (ground truthing)

Survey type	Recommended survey period	Relevant survey guidance	Survey coverage	Survey period
National Vegetation Classification (NVC)	May – August (optimal period)	JNCC National Vegetation Classification Users' Handbook (Ref. 8.35)	Main Application Site.	May 2018 – June 2018, and May 2019
Hedgerow assessment	April - October	Defra Hedgerow Survey Handbook (Ref. 8.36)	Main Application Site, Off-site habitat creation areas.	July 2019 and November 2019[1]
Badger	All year (winter months optimal)	The Mammal Society: Surveying Badgers (Ref. 8.37), Natural England: Guidance on 'Current Use' in the definition of a Badger sett (Ref. 8.38)	Main Application Site, Junction 10 of M1. Territory mapping undertaken on Main Application Site and accessible land to the north and east within 500m.	May 2018 – November 2019, additional bait marking completed in 2020. Ground truth in relation to current status of known setts in May/June 2022, and survey for new setts.
Bats	April – October (where hibernating potential absent).	The Bat Conservation Trust Bat surveys for professional ecologists: good practice guidelines (Ref. 8.39).	Main Application Site including the Airport Access Road (AAR), and off-site mitigation planting area, comprising ground based assessments, tree climbing assessments, emergence and re-entry surveys, bat activity static surveys and transect surveys, back-tracking surveys, and trapping surveys.	August 2016 – September 2020, plus static detector surveys repeated in April to October 2021.
Hazel dormouse	April - November	English Nature: The Dormouse	Main Application Site comprising	May 2018 – November 2018

[1] Hedgerow surveys undertaken in sub-optimal period (November) relate only to the hedgerows proposed for enhancement planting as part of the offsite habitat creation, hedgerows that will be lost to construction of the Proposed Development were surveyed in the optimal period (July).

Survey type	Recommended survey period	Relevant survey guidance	Survey coverage	Survey period
		Conservation Handbook (Ref. 8.40).	habitat assessment, feeding remains/nut search, and nest tube/box survey.	
Otter	All year in suitable weather conditions	English Nature: Ecology of the European Otter (Ref. 8.41), Environment Agency: Fourth Otter Survey of England 2000-2002 (Ref. 8.42)	Watercourses connected to the Off-site Highways Interventions (no watercourses/ waterbodies connected to the Main Application Site)	June/July 2019 and September 2019. Ground truthing exercise July 2022.
Water vole	April - October	The Mammal Society: The Water Vole Mitigation Handbook (Ref. 8.43)	Watercourses connected to the Off-site Highways Interventions (no watercourses/ waterbodies connected to the Main Application Site)	June/July 2019 and September 2019. Ground truthing exercise July 2022.
Amphibians	March – June (pond based surveys)	English Nature: Great Crested Newt Mitigation Guidelines (Ref. 8.44), ARG UK: GCN HSI Advice Note 5 (Ref. 8.45)	Main Application Site plus 500m, comprising Habitat Suitability Index (HSI), presence/absence surveys, eDNA surveys.	February – May 2018, November 2019 (HSI), April to May 2020
Reptiles	March – June, September	Froglife: Reptile survey booklet (Ref. 8.46), Herpetofauna Groups of Britain and Ireland: Herpetofauna Workers Manual (Ref. 8.47)	Main Application Site, comprising habitat assessment and artificial refugia survey.	April 2018 – July 2019
Breeding birds	March - June	British Trust for Ornithology: Common Bird Census	Main Application Site plus 500m, comprising two	April and July 2018, and April and June 2021

Survey type	Recommended survey period	Relevant survey guidance	Survey coverage	Survey period
		Instructions (Ref. 8.48), RSPB: Bird monitoring methods (Ref. 8.49)	transect routes, four visits per year.	
Wintering birds	November - February	British Trust for Ornithology: Common Bird Census Instructions (Ref. 8.48), RSPB: Bird monitoring methods (Ref. 8.49)	Main Application Site plus 500m, comprising two or one transect route, and monthly visits.	Two transects surveyed December 2017 – March 2018, and with more detailed surveys October 2018 – March 2019. A single transect route was repeated November 2021 to February 2022, as the southern expansion option was no longer considered.
Barn owl	Spring – Summer	Barn Owl Trust: Barn Owl Conservation Handbook (Ref. 8.50)	Main Application Site plus 1.5km, comprising a ground level assessment of suitable features, and nest verification surveys.	May 2019 – July 2019
Red kite	Spring – Summer	RSPB: Bird monitoring methods (Ref. 8.49)	Main Application Site plus 1.5km, comprising two daytime surveys for active nests.	April 2019
Roman snail	Spring – Autumn (weather dependant)	E. Pollard: Aspects of the Ecology of *Helix pomatia L* (Ref. 8.51)	Main Application Site and suitable habitat [redacted] comprising habitat assessment, daytime hand search and	June 2018 – June 2019, September 2020

Survey type	Recommended survey period	Relevant survey guidance	Survey coverage	Survey period
			nocturnal torchlight surveys.	
Terrestrial invertebrates	April - October	For the specific survey guidance relating to a range of different invertebrate species see Invertebrate report Appendix BB1 of the Ecology Baseline report (**Appendix 8.1** of this ES **[TR020001/APP/5.02]**)	Main Application Site, comprising multiple methods.	April 2018 – June 2019, June 2021

8.5.4 The validity and limitations for the survey methodologies and timing are outlined within the Ecology Baseline Report, **Appendix 8.1** of this ES **[TR020001/APP/5.02]**. Consultation on the validity of survey data has been undertaken during the TWG meetings, including the most recent (12 September 2022 as summarised in **Table 8.7**, **Section 8.4)**. Agreements were reached in previous TWG meeting of what surveys would be required in addition to those proposed, and these were conducted accordingly. During the most recent meeting, it was noted that there has been survey effort over several years and that whilst some surveys had not been repeated since 2019, no objections were raised with regard to the validity of this data to inform the ES **[TR020001/APP/5.01]**. It was agreed that the survey effort showed consistent results and that pre-construction surveys would provide any needed updates prior to construction. Similar support was received within feedback on the 2022 PEIR from other consultees as detailed in the **Consultation Report [TR020001/APP/6.01]** and **[TR020001/APP/6.01]**.

8.5.5 The approach to defining future baseline is described in **Section 5.4** of **Chapter 5** of this ES **[TR020001/APP/5.01]**. The future baseline considered for biodiversity is described **Section 8.7** of this chapter.

Assessment methodology

8.5.6 All relevant impacts to designated nature conservation sites, habitats and species that may occur as a result of the Proposed Development during construction and operation have been assessed.

8.5.7 The assessment methodology uses both the importance (or value) of the ecological feature and the magnitude of the impact to determine the significance of the effect. This method of determining ecological value and significant effects is in line with the principles of the CIEEM guidance on Ecological Impact

Assessment (2018) (Ref. 8.30) and also follows the approach adopted across chapters within this ES **[TR020001/APP/5.01]**.

8.5.8 Wherever possible, maintaining favourable conservation status has been determined by reference to literature, including designated sites and LBAP objectives and targets where applicable, and by professional judgement in the absence of clear guidance. An effect is considered 'beneficial' if it helps to deliver conservation policies or objectives or 'adverse' if it is contrary to conservation policies or objectives.

8.5.9 Design of the Proposed Development has evolved over the years during which the Proposed Development has been under consideration. This has included building in avoidance of impacts on sensitive ecological receptors such as Winch Hill Woods into the design, to retain the woodland along the ridgeline of Winch Hill, and to retain hedgerows where possible. Where there are impacts, mitigation measures to avoid or reduce potentially significant adverse effects have also been developed. The residual effects on impacted ecological features following the implementation of proposed mitigation has also been assessed. Should significant adverse effects remain after mitigation strategies have been devised and their success considered, then it would be necessary to provide appropriate compensation measures to offset significant residual adverse effects.

8.5.10 Opportunities have also been taken to provide biodiversity benefits in accordance with policy, best practice and the new requirements of the Environment Act 2021 (Ref. 8.3). This includes enhancement of hedgerows within the wider landscape to provide habitat opportunities for a range of species and improve ecological connectivity. A Defra BNG calculation has been undertaken to quantify habitat losses and gains as part of the assessment. This calculation follows guidance produced by Defra and uses Biodiversity Metric 3.1 developed by Natural England (Ref. 8.2). The metric has been used to guide the habitat creation measures designed into the Proposed Development to ensure a net gain in biodiversity. The results of the BNG assessment are presented within the Biodiversity Net Gain Report, **Appendix 8.5** of this ES **[TR020001/APP/5.02]**.

Significance criteria

Determination of Importance Ecological Features

8.5.11 Ecological features can be important for a variety of reasons. Importance may relate, for example, to the quality or extent of designated nature conservation sites or habitats, to habitats/species rarity, to the extent to which they are threatened throughout their range, or to their rate of decline (Ref. 8.52).

8.5.12 The importance of each ecological feature is evaluated within a defined geographical context. The following frame of reference is used to define ecological importance of features; further definitions of each can be found in **Table 8.9**:

a. international and European;

b. national;

c. regional;

d. metropolitan, county, vice-county or other local authority-wide area (district/borough); and

e. local.

Table 8.9: Hierarchy of Ecology and Nature Conservation Value

Geographical Value	Criteria	Examples
International and European	Very high ecological importance or rarity, internationally protected, limited potential for substitution.	Internationally designated nature conservation sites e.g. SPA and SAC. Sustainable area of a habitat listed on Annex I of the Habitats Directive where it is a qualifying feature of a national site network site, or where smaller areas of such habitat are essential to maintain the viability of a larger whole. Sustainable population of a species listed on Annex IV of the Habitats Directive or Annex I of the Birds Directive where it is a qualifying feature of a national site network site.
National	High ecological importance or rarity, nationally protected or important, limited potential for substitution.	Nationally designated nature conservation sites e.g. SSSIs. Sustainable area of a legally protected habitat (e.g. priority habitat). Sustainable population of a legally protected species listed (e.g. such as listed under Schedules 1, 5 or 8 of the Wildlife and Countryside Act 1981, or a priority species, or a UK Red Data book species, or of a nationally rare species (15 or fewer 10 km squares in the UK).
Regional	High or Medium	Sites, habitats or species with some potential for substitution which have regional importance, but which are not protected under legislation (although Local Plans may specifically identify them) e.g. viable areas or populations of Regional Biodiversity Action Plan habitats or species. High value for rare or high quality examples within the region, and medium value for those more common examples/species.
County/district	Medium or Low ecological importance or rarity, some potential for substitution.	Locally designated nature conservation sites e.g. LNR, CWS. Nationally scarce species (e.g. recorded in 16 – 100 10 km squares in the UK) or Annex 1 habitats of the Habitats Directive, where not a qualifying feature of a national site network site. Medium value for less common or better quality examples within the County or district,

Geographical Value	Criteria	Examples
		and Low value for those more common and widespread examples/species.
Local	Low or Very Low ecological importance or rarity, locally protected or important, potential for substitution.	Undesignated nature conservation sites that are good examples of a more widespread habitat, or species-poor examples of a habitat of note. Population of a species that is of low importance/rarity but of some value locally.

8.5.13 It should be noted that as the importance of ecological features is determined with regard to the extent of habitat or size of population that may be affected by the Proposed Development, each status can differ from that which would be inferred by legislative protection or through identification as a conservation notable species. For example, house sparrow (*Passer domesticus*) is important at a national level because it is a species of principal importance (as listed on Section 41 of the NERC Act 2006 (Ref. 8.1)) and features on the Birds of Conservation Concern red list (Ref. 8.53). However, a small population that could be affected by a development would often be assessed as being of less than national importance due to the large, albeit declining, national population (in excess of 5 million pairs (Ref. 8.54)). Similarly, a small length of hedgerow, which is a habitat of principal importance (as listed on Section 41 of the NERC Act 2006 (Ref. 8.1)), even if deemed to be 'Important' with regard to the Hedgerows Regulations, may not be considered to be of national importance due to the extent of this habitat type across a given county. Consequently, information regarding the extent and population size, population trends and distribution of the ecological features has been used to determine importance at the project level. Where detailed criteria or contextual data are not available, professional judgement has been used to determine importance.

8.5.14 With the exception of species receiving specific legal protection or subject to legal control (for example invasive species), all ecological features that were determined to be of negligible (site) importance have been scoped out of the assessment. Further, ecological features of local importance, where there is a specific technical justification, have also been scoped out such as coniferous plantation woodland.

Magnitude of Impact

8.5.15 Impacts to ecological features, both adverse and beneficial, are identified and characterised with reference to the following factors:

a. scale - the severity of the impact on a receptor;

b. spatial extent - the geographic area over which the impact/effect will occur;

c. duration – the time interval over which the activity is likely to impact on the receptor generally assessed as short, medium or long term;

d. reversibility – assessed as permanent or temporary and reversible or not reversible;

e. timing – when the impact occurs in relation to the life cycle of the receptor; and

f. frequency - rare or frequent event, constant or intermittent.

Determination of Significant Effects

8.5.16 For consistency across all disciplines, the factors listed above have been used to inform the determination of the magnitude of impact and importance of receptor; however, the assessment of effects will follow the criteria detailed in **Section 5.4** of **Chapter 5** of this ES **[TR020001/APP/5.01]**. This will consider the value of the receptor, and what the magnitude of the effect will have on the receptor, taking into account the sensitivity of the receptor to that effect.

8.5.17 The factors that contribute to the sensitivity of an ecological receptor in relation to the Proposed Development include pathways for physical, chemical or biological change such as direct loss, fragmentation or disturbance, size of the resource or feature such as area or number of individuals of a particular species affected, rarity/typicalness, adaptability/fragility and recreatability/sustainability.

8.5.18 As all ecological receptors will exhibit a greater or lesser degree of sensitivity to the magnitude of change brought about by the Proposed Development, establishing a common scale of measurement helps to ensure that the assessment is both transparent and robust.

8.5.19 As such, for the purposes of this assessment the following terminology for magnitude and sensitivity has been adopted, definitions for each of these are provided in **Tables 5.5** and **5.6** in **Chapter 5** of this ES **[TR020001/APP/5.01]**:

a. very low (negligible);

b. low;

c. medium; and

d. high.

8.5.20 The above terms have been applied in principle in line with **Table 8.10** taking into account professional judgement as set out in CIEEM guidance (Ref. 8.30).

Table 8.10: Effects matrix.

Magnitude	Value of receptor			
	High	Medium	Low	Very Low
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Minor
Low	Moderate	Minor	Minor	Negligible
Very low	Minor	Minor	Negligible	Negligible

8.5.21 As a general rule major and moderate effects are considered to be significant, whilst minor and negligible effects are considered to be not significant. However, professional judgement has also been applied where necessary. **Table 8.11** provides a translation summary of how the classification of significance has been interpreted for consistency with CIEEM EcIA guidance (Ref. 8.30).

8.5.22 Note that the term 'significance' in this context is not the same as that applied under the Habitats Regulations. Significance in the context of the Habitats Regulations is used as the first stage of the process to determine whether it can be concluded the overall scale of the mechanism and possible pathway for an impact are not likely to have a significant effect. The potential for likely significant effects on national site network sites is assessed in the HRA NSER, **Appendix 8.3** of this ES **[TR020001/APP/5.08]**.

8.5.23 Beneficial effects that are not likely to be significant have also been described, as information about these effects may assist the competent authorities in determining whether the Proposed Development complies with the guidance in the ANPS and references in the NPPF (which may be relevant and important to the Secretary of State's decision) relating to biodiversity enhancement, to which both significant and not significant effects can make a contribution.

Table 8.11: Ecological interpretation of classification of significance

Significance	Description
Major adverse	Medium term and/or moderate scale/moderate magnitude negative effect on integrity and/or conservation status of feature of national or international value. Permanent or long-term and/or large scale/large impact magnitude negative effect on integrity and/or conservation status of features of county or greater value.
Moderate adverse	Temporary and/or small scale/small magnitude negative effect on integrity and/or conservation status on features of national or international value. Short or medium term and/or moderate scale/moderate magnitude negative effect on integrity and/or conservation status of feature of county or greater value. Permanent or long-term and/or large scale/large magnitude negative effect on integrity and/or conservation status on feature of local value.
Minor adverse	Temporary and/or very small scale/very small magnitude negative effect on integrity and/or conservation status of feature of county or greater value. Temporary and/or small scale/small magnitude negative effect on integrity and/or conservation status of feature of local, district or county value.

Significance	Description
	Medium term and/or moderate scale/moderate negative effect on integrity and/or conservation status of feature of less than local, local or district value. Permanent or long-term and/or large scale negative effects on the conservation status of features of less than local value.
Negligible	Temporary and/or very small scale/ very small magnitude negative effect, unlikely to have discernible change on integrity and/or conservation status of features of local or district value. Permanent or long-term and/or small scale/small magnitude negative effect on integrity and/or conservation status of feature of less than local value.
Minor beneficial	Temporary and/or small scale/small magnitude positive effect on integrity and/or conservation status of local, district or county value. Permanent or long-term and/or large scale positive effects on the conservation status of features of less than local value.
Moderate beneficial	Temporary and/or small scale/small magnitude positive effect on integrity and/or conservation status on features of national or international value. Short or medium term and/or moderate scale/moderate magnitude positive effect on integrity and/or conservation status of feature of county or greater value. Permanent or long-term and/or large scale/large magnitude positive effect on integrity and/or conservation status on feature of local value.
Major beneficial	Permanent or long-term and/or large scale/large magnitude positive effect on integrity and/or conservation status on feature of county or greater value.

8.6 Assumptions and limitations

8.6.1 This section provides a description of the assumptions and limitations to the biodiversity assessment.

8.6.2 Assumptions and limitations specific to designated sites, species and habitat surveys are included within the Ecology Baseline Report (**Appendix 8.1** of this ES **[TR020001/APP/5.02]**). It is considered that all surveys have been completed without significant limitations that would potentially compromise results.

8.6.3 Records obtained as part of the desk study provide some indication of the presence of certain species. They do not, however, represent a definitive inventory of all species present within the Study Area. The inclusion of a species, or conversely the absence of a species does not necessarily mean that species remains present or absent beyond the time of that record.

8.6.4 Survey data is considered sufficient to inform this assessment. Updated surveys and the age of data has been discussed with stakeholders in the most recent TWG, no objections were raised regarding the age of survey data and validity of survey data was supported in the statutory responses to the PEIR as detailed in the **Consultation Report [TR020001/APP/6.01]** and **[TR020001/APP/6.01]**. There was a general agreement that the habitats have not changed and that appropriate repeated survey effort has been undertaken.

8.6.5 The desk study (including supply of third party data) was originally undertaken in 2018 and updated in November 2020. As these dates posed a potential limitation in relation to more current records, the desk study was again updated in June 2022 to ensure that it was relevant for this ES.

8.6.6 The assessment of the baseline conditions has assumed the following;

a. All noted ancient and veteran trees can be retained with the exception of one which is to be re-coppiced and translocated (**Appendix 14.2** and **14.3** of this ES **[TR020001/APP/5.02]**).

b. The detailed design of the Off-site Car Park works at Luton Parkway will aim to retain as much of the features of Luton Parkway Verges DWS as possible. Where feasible, works will be restricted during construction and operation to existing areas of hardstanding and will therefore minimise effects to the designated features of Luton Parkway Verges DWS and habitats that could support protected species and bee orchids (*Ophrys apifera*), for which records were noted within the DWS.

c. All Off-site Highways Intervention schemes, with the exception of junction 10 M1, will remain restricted to the highway boundary.

e. The assessment of the fuel pipeline that extends to the east of the Main Application Site is based on an assumed 20m working corridor, extending 10m either side of the line of the fuel pipeline route as mapped.

f. The two buildings noted to be bat roosts (single common pipistrelle (*Pipistrellus pipistrellus*) summer day roosts) will be retained. These

include the pillbox[2] (lies within the provision of open space) and Winch Hill Cottage (2) (which lies outside of the Order Limits). Details of which are included within the Ecology Baseline Report (**Appendix 8.1** of this ES **[TR020001/APP/5.02]**).

g. The detailed design of the fuel pipeline that extends to the east of the Main Application Site will aim to remain at least 30m from any main badger setts. Construction practices will minimise disturbance and prevent fragmentation of habitat where possible, whilst preventing harm to badger such as due to open excavations.

Reasonable Worst Case

8.6.7 **Chapter 5** Approach to the Assessment **[TR020001/APP/5.01]** describes the general approach adopted to ensure that a reasonable worst case is assumed in this assessment including the use of parameters, accounting for uncertainty, and incorporating flexibility in design and demand forecasts.

8.6.8 Further relevant assumptions on worst case specific to this assessment include:

a. vegetation clearance is undertaken to the extents of the areas mapped within the Site Clearance drawings **LLADCO-3C-ACM-WHS-SCL-DR-IN-0001 to 0003** within the Construction Method Statement and Programme Report **Appendix 4.1** of the ES **[TR020001/APP/5.02]**;

b. assuming all of Wigmore Park CWS is lost as although there may be a remaining hedgerow, which is an important corridor to retain, this would not be considered a CWS on its own;

c. potential disturbance of two main badger setts unless it can be determined through detailed design that they can be left undisturbed; and

d. only the single location for a replacement cluster of three small ponds is permitted within the Proposed Development.

[2] Locally known as, and therefore referred to as, the 'Pillbox'' in Biodiversity documents and figure within the ES, listed as World War II Battle Headquarters in Cultural Heritage **Chapter 10** of this ES **[TR020001/APP/5.01]**

8.7 Baseline conditions

8.7.1 This section provides a summary of the description of the existing ecological baseline conditions within the Main Application Site and wider ZOI, concerning protected and notable species and sites designated for nature conservation. For full details, refer to the Ecology Baseline Report **Appendix 8.1,** of this ES. **Figures 8.1** and **8.2** to this ES **[TR020001/APP/5.03]** show the locations of statutory and non-statutory designated nature conservation sites respectively, and **Figure 8.3** of this ES **[TR020001/APP/5.03]** illustrates the Ecological Constraints Plan associated with the Proposed Development. The Ecology Baseline Report Appendices (**Appendix 8.1** of the ES **[TR020001/APP/5.02]**) identifies the results of protected species surveys undertaken between 2016 and 2022.

8.7.2 The Main Application Site covers approximately 428ha which in addition to the airport infrastructure comprises previously undeveloped, predominantly arable land (some of which has since been sown with a grass seed mix and managed), with hedgerows, trees and shrub-lined margins. Occasional woodland blocks, copses, tree belts, areas of scrub, rough grassland, ruderal vegetation, conservation headlands and game cover adjacent to field edges.

8.7.3 The Proposed Development also includes Off-site Highway Interventions and Off-site Car Parks works outside of the Main Application Site, as defined in **Chapter 2** of the ES **[TR020001/APP/5.01],** and covers approximately 474ha, which predominantly comprises previously developed land. The Off-site Highway Interventions are largely restricted to within existing highway boundaries. The proposed Off-site Car Parks are located to the west of the existing airport within brown field areas comprising access roads, temporary buildings, area of ephemeral/ short perennial vegetation, grassland margins and areas of landscaping comprising scrub and trees. The Off-site Planting areas are located to the north east of the Main Application Site, as defined in **Chapter 2 [TR020001/APP/5.01]**, comprising grassland field margins and hedgerows.

8.7.4 The existing airport is dominated by hardstanding with amenity grassland and small patches of scrub.

Existing conditions

Designated nature conservation sites

8.7.5 There are no international designated nature conservation sites including SACs candidate SACs (cSACs), SPAs, potential SPAs (pSPAs) and Ramsar sites within 10km of the Main Application Site, and no sites designated for bat species within 30km. The SACs and SPAs fall under the National Site Network which replaced the Natura 2000 sites. Ramsar sites do not fall under the National Site Network despite previously being part of the Natura 200 sites as they are often also designated as SPAs. The closest international designated nature conservation site is Chiltern Beechwoods SAC, located approximately 13km south west of the Main Application Site. The closest international designated nature conservation site designated for its bird assemblage is Lea

Valley SPA, located approximately 24.4km south east of the Main Application Site (**Figure 8.1** of this ES **[TR020001/APP/5.03]**).

8.7.6 There are a further 21 statutory designated nature conservation sites within 10km of the Main Application Site. Thirteen of these sites are SSSIs, one of which is also designated as a NNR, another is also designated as a LNR, and eight further LNRs are present, as detailed in the Ecology Baseline Report (**Appendix 8.1** of this ES **[TR020001/APP/5.02]**). None of these lie within the Main Application Site. Two further SSSIs lie at 10km from the Main Application Site. The closest SSSIs to the Main Application site comprise the following, and all others are greater than 5km from the Main Application Site:

a. Dallow Downs and Winsdon Hill SSSI/DWS, located approximately 2.9km west of the Main Application Site;

b. Cowslip Meadows SSSI/DWS, located approximately 4.1km north west of Main Application Site;

c. Wain Wood SSSI, located approximately 4.3km north east of the Main Application Site; and

d. Galley and Warden Hills SSSI/LNR, located approximately 4.5km north west of the Main Application Site.

8.7.7 Although the Proposed Development lies within the Impact Risk Zones (IRZ) identified for these SSSI sites for the criteria 'Airports, helipads and other aviation proposals', given the designated features of these statutory sites (Table 2.1 of the Ecology Baseline Report (**Appendix 8.1** of this ES **[TR020001/APP/5.02]**)) and their distance from the Proposed Development it is not anticipated that the construction of the Proposed Development will result in significant effects upon them. Potential air quality impacts on statutory designated sites within 5km of the Main Application Site, and/or 200m of the Affected Road Network (ARN), during operation, are detailed within **Chapter 7** of this ES **[TR020001/APP/5.01]**, including impacts on SSSIs where appropriate. Natural England's Air Quality Distance Criteria for airports, in line with the Inter-agency Air Pollution Group, recommends 5km (Natural England comment received as part of the statutory consultation on the 2022 PEIR as reported in the **Consultation Report [TR020001/APP/6.01]** and **[TR020001/APP/6.01]**), plus consideration of effects on nearby roads potentially at a greater distance than 5km. Five SSSIs (one of which is also an LNR) are taken through to be assessed for potential air quality effects due to being located within 5km from the Main Application Site and/or 200m from the ARN, including the four listed in paragraph 8.7.6 within 5km, and Smithcombe, Sharpenhoe and Sundon Hills SSSI which lies within 200m of the ARN but 8.3km from the Main Application Site.

8.7.8 There were previously three CWS or DWS that had been proposed for designation as SSSIs, two of which, Cowslip Meadows DWS, and Dallow Downs and Winsdon Hill DWS, are now SSSIs, as noted above. A third, Bradgers Hill CWS (c.2.6km north of the Main Application Site), is not yet a SSSI as it was in earlier stages of the consideration process than the others.

8.7.9 There are 30 non-statutory designated nature conservation sites located within 2km of the Proposed Development. Local authorities use different terms to refer to wildlife sites, with Hertfordshire using LWS and Bedfordshire and Luton classifying them as CWS and DWS. Full details of these sites are included in the Ecology Baseline Report (**Appendix 8.1** of this ES **[TR020001/APP/5.01]**). The six which have been assessed as potentially impacted by the Proposed Development, plus a further 13 potentially affected via air quality impacts on non-statutory designated sites as a result of being within 2km of the Main Application Site and/or 200m of the ARN, are therefore scoped in to this assessment, and summarised in **Table 8.12**. A further 35 Wildlife Sites are discussed briefly in terms of air quality but are too numerous to list here.

Table 8.12: Non-statutory designated nature conservation sites scoped into the assessment of Proposed Development

Site Name	Description	Proximity to Main Application Site	Geographical Importance	Receptor Value
Wigmore Park CWS	Comprises species rich neutral grassland with scattered scrub, ruderal vegetation and a length of green lane. The site is recognised for its neutral grassland, calcareous grassland and hedgerows.	Within	County	Medium
Winch Hill Wood CWS/ LWS	This site is designated within both Bedfordshire (as a CWS) and Hertfordshire (as an LWS). It is recognised for its section of ancient woodland, as included on the ancient woodland inventory, comprising semi-natural broadleaved woodland with hedgerow, scrub and areas of open bracken. It is a remnant of a larger ancient semi-natural pedunculate oak (*Quercus robur*)/ hornbeam (*Carpinus betulus*) with birch (*Betula sp.*) woodland, with ground flora dominated by bluebell (*Hyacinthoides non-scripta*). The NVC included in the Ecology Baseline Report (**Appendix 8.1** of this ES **[TR020001/APP/5.02]**) reports the site as half low and half low-moderate botanical value, relating to the areas classed as ancient woodland and not ancient woodland.	Within	County	Medium

Site Name	Description	Proximity to Main Application Site	Geographical Importance	Receptor Value
Dairyborn Scarp DWS	This site was formerly part of a larger site called Dairyborn Scarp CWS which had additional grassland interest (no longer present within this designation). It comprises a steep chalk scarp dominated by ruderal vegetation and scrub, with a potential small remnant of ancient woodland, but is not included within the ancient woodland inventory. It is also stated that it may be a remnant of Spittlesea Wood but does not meet the criteria for a DWS on this habitat type. The site is a habitat mosaic likely to be of value for invertebrates, based on the diversity of habitat features.	Within, and within 200m of the ARN	District	Medium
Luton Parkway Verges DWS	Recognised for its calcareous and neutral grassland with several calcareous/neutral grassland indicators recorded.	Within the new Off-site Car Park (120m west of Main Application Site)	District	Medium
Burnt Wood LWS	Comprises an Ancient Woodland Inventory site of ancient semi-natural pedunculate oak/ hornbeam woodland largely replanted with conifers. The site includes old pits, wood banks and a diverse ground flora, including bluebell.	Immediately adjacent 12m south	County	Medium
Luton Hoo Park CWS	Recognised for its ancient woodland, special woodland interest and diversity.	150m south west but adjacent to an Off-site Highway Intervention on the A1081 and within 200m of the ARN	County	Medium

Site Name	Description	Proximity to Main Application Site	Geographical Importance	Receptor Value
Vauxhall Way LWS	Habitat mosaic consisting of amenity, improved and semi-improved neutral grassland, plantation and semi-natural woodland, hedgerows and scrub. It also acts as a wildlife corridor.	190m north and within 200m of the ARN (within an area of Off-site Highway Intervention but no site clearance identified)	County	Medium
River Lea CWS	River with associated riparian habitats with fen, marsh and swamp in addition to neutral grassland, scrub, hedgerows and trees. The river supports a population of water vole.	270m south west but immediately adjacent to an area of Off-site Highway Intervention on the A1081	County	Medium
Slaughters Wood and Green Lane CWS	Ancient semi-natural woodland with an understorey of coppiced hazel (*Corylus avellana*). The site is recognised for ancient woodland and hedgerows with historical importance. Also present are neutral grassland, scrub and bracken.	440m north, but within 200m of the ARN	County	Medium
River Lea DWS	Undeveloped floodplain associated with the river. Also present are neutral grassland, scrub, trees, hedgerows and allotments.	790m west and within 200m of the ARN	District	Medium
Kidney and Bull Woods CWS	Ancient semi-natural woodland and trailing tormentil (*Potentilla erecta*) with conifer and mixed plantation and neutral and marshy grassland.	840m west, but within 200m of the ARN	County	Medium
The Chase LWS	A belt of broadleaved woodland, grading into dense scrub to the north. The woodland contains coppiced hazel (*Corylus avellana*) and field maple (*Acer campestre*)	1.9km north west but within 200m of the ARN	County	Medium

Site Name	Description	Proximity to Main Application Site	Geographical Importance	Receptor Value
	and has a grassland ground flora in its more open areas.			
Stockwood Park CWS	A public park within the grounds of a former stately home, the site comprises formal gardens, golf course and areas of broadleaved woodland, lowland meadow and parkland with mature trees.	1.96km south west but within 200m of the ARN	County	Medium
Heavens Wood & Chalk Wood LWS	Two areas of ancient semi-natural pedunculate oak and hornbeam coppiced woodland with some plantation. Chalk Wood now supports mostly silver birch with some sweet chestnut (*Castanea sativa*) coppice. Heavens Wood in the south has some large pedunculate oak standards with hornbeam and hazel coppice, wild cherry, silver birch and rowan (*Sorbus aucuparia*).	Within 200m of the ARN	County	Medium
Honeygate and Crick Hills LWS	The site contains species rich calcareous scrub with calcareous grassland, hedgerows, mature trees and other historic features. It is also an important wildlife corridor.	Within 200m of the ARN	County	Medium
Riverside Walks CWS	Habitat mosaic containing ruderal vegetation, mature trees, secondary woodland, scrub, swamp and open water.	Within 200m of the ARN	County	Medium
Priory Park Icehouse LWS	Building and environs important for protected species.	Within 200m of the ARN	County	Medium
Kingshoe Wood CWS	Comprises multiple woodlands including one which is part ancient semi-natural woodland. The brook that runs through the site is mostly dry with a stony, sandy or silty bed and occasional small pools of water.	Within 200m of the ARN	County	Medium
River Flit CWS	River with adjacent habitats, including ponds, leat, ditches, rough grassland, ruderal vegetation, scrub, copses, plantations, wet	Within 200m of the ARN	County	Medium

Site Name	Description	Proximity to Main Application Site	Geographical Importance	Receptor Value
	woodland, mature trees and pollards.			

Habitats

8.7.10 The Main Application Site is located on the eastern edge of Luton, with industrial and residential properties to the west and north, and agricultural fields to the east and south. Several habitat types are present within the extent of the Proposed Development, forming a mosaic of inter-connected habitats across the local landscape. A brief summary of the notable habitat types and those considered of relevance to the assessment of the Proposed Development is provided in **Table 8.13**. Full habitat descriptions are provided within the Ecology Baseline Report (**Appendix 8.1** of this ES **[TR020001/APP/5.02]**).

Table 8.13: Notable habitats present and scoped into the assessment of the Proposed Development

Habitat	Brief description and valuation	Geographical Importance	Receptor Value
Ancient woodland	Winch Hill Wood CWS/LWS (Woodland 6 - Ecology Baseline Report (**Appendix 8.1** of this ES **[TR020001/APP/5.02]**)) (less than 2ha) is a remnant of ancient and semi-natural woodland in the east of the Main Application Site, north of the runway adjacent to the country road through Winch Hill. This woodland has been subject to National Vegetation Classification (NVC) surveys; the broad-leaved woodland found here varies in its composition from east to west. At the east the species composition is characteristic of NVC W10 *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland. The most western section is dominated by mature hornbeam, though this section does not fit well into an NVC category and is considered an intermediate between W10 and W8 *Fraxinus excelsior – Acer campestre – Mercurialis perennis*. The woodland covers an area of approximately 2ha, of which 1.5ha is included on the ancient woodland inventory. The woodland qualifies as a habitat of principal importance listed under	County as designated as CWS and not higher values such as SSSI	Medium due to their importance within the County and a low tolerance to change/ increased time to be replaced.

Habitat	Brief description and valuation	Geographical Importance	Receptor Value
	Section 41 of the NERC Act 2006 and a conservation priority of the Bedfordshire and Luton LBAP and Hertfordshire LBAP. Taking account of its small size, within the context of its designations, Winch Hill Wood CWS/LWS is of county value. In addition, Kidney and Bull Woods, George Woods, Stubbocks Wood, Slaughters Wood, Heavens wood and Chalk Wood, Furzen Wood, Watkin's Wood and Lord's Wood, Sewetts Wood, Hurst Wood, Kingshoe wood, Withstocks Wood, Hardingdell Woods, Horsleys Wood, Birch wood are all areas of ancient woodland which lie outside of the Proposed Development, but within 2km of it, and/or within 200m of the ARN and therefore are included for air quality effects only.		
Broadleaved semi-natural woodland	In addition to Winch Hill wood there are six small broadleaved semi-natural woodlands located within the Main Application Site: a. woodland 1 (Ecology Baseline Report (**Appendix 8.1** of this ES **[TR020001/APP/5.02]**)), an area of ash and hornbeam dominated woodland, the species composition of which is characteristic of the NVC W8 *Fraxinus excelsior – Acer campestre – Mercurialis perennis* community. This woodland is located within the east of the site; b. woodland 5, a small area of hornbeam and oak dominated woodland within the south east of the site; c. woodland 7, and an area of oak and ash dominated woodland to the south east of Wigmore Park; d. woodland 11, a small area located south of woodland 5 and the runway approach lights, comprising hornbeam, oak, blackthorn (*Prunus spinosa*) and elder (*Sambucus nigra*). e. woodland 12, a small area of oak, hornbeam, holly (*Ilex aquifolium*)	District	Medium due to their importance within the District and a lower tolerance to change/ increased time to be replaced.

Habitat	Brief description and valuation	Geographical Importance	Receptor Value
	and silver birch, on the edge of the Main Application Site, north east of woodland 3; and f. woodland 14, a small woodland strip within Dairyborn Scarp, in the west of the site. These woodlands qualify as lowland mixed deciduous woodland, a habitat of principal importance and a conservation priority of the Bedfordshire and Luton LBAP and Hertfordshire LBAP. Broadleaved semi-natural woodland within the Proposed Development area is of district value due to their small and fragmented areas within the main application site.		
Broadleaved plantation woodland	Areas of broadleaved plantation woodland are present within the Main Application Site. These include patches of replanted woodland within the semi-natural woodland in the south east of the Main Application Site as described above (woodland 5), and areas within Wigmore Park (woodland 8) and Dairyborn Scarp. Broadleaved plantation woodland within the Proposed Development area is of no more than local value.	Local	Low as can be good quality habitat but only of local value. Can be replaced, but longer time to mature.
Ancient and veteran trees	The Tree Survey Report and Arboricultural Impact Assessment (AIA) provided in (**Appendix 14.2 and 14.3** of this ES **[TR020001/APP/5.02]**) identifies one ancient and veteran tree to the south east of Wigmore Park CWS within the east of the Main Application Site; an ancient ash coppice stool, which will be affected by the Proposed Development. A further eight other ancient and veteran trees and a small group of five ancient and veteran trees have been identified within the Main Application Site and wider area, however all will be retained as part of the Proposed Development. Additional future potential veteran trees will also be retained.	District	Medium due to their importance within the District and a lower tolerance to change/ increased time to be replaced.

Habitat	Brief description and valuation	Geographical Importance	Receptor Value
	Veteran trees support features such as rot holes and dead wood which provide habitat opportunities for a range of other flora and fauna species. As such each of the veteran and potential veteran trees within the Proposed Development are of district value.		
Species-rich hedgerows	A limited number of hedgerows across the Main Application Site are species-rich and intact, as shown on the Phase 1 Habitats Plan within Ecology Baseline Report (**Appendix 8.1** of this ES **[TR020001/APP/5.02]**). The majority of those noted were found within the wider provision of open space and habitat creation areas where they will be retained. The hedgerows within the Main Application Site form part of a network across the wider landscape, which provides important habitat and ecological corridors. Hedgerows are a habitat of principal importance and a conservation priority of the LBAPs. Detailed hedgerows surveys have confirmed the presence of sixteen hedgerows, within or immediately adjacent to the Main Application Site, that meet the Hedgerow Regulations 1997 criteria of an 'Important' hedgerow, but all appear to be within areas of provision of open space or habitat creation areas, and therefore will be retained. The hedgerow network that extends across the Proposed Development site and adjacent land is of district value.	District	Medium due to their importance within the District, although can be replaceable.
Scrub – dense and scattered	Dense and scattered scrub are found within areas of Wigmore Park where a lack of management has resulted in stands of dense hawthorn (*Crataegus monogyna)*, blackthorn, willow (*Salix sp.*) or bramble (*Rubus* spp.) scrub. They are also found within areas of derelict farmland, either outgrown from hedgerows or adjacent to derelict farm buildings. Extensive patches of dense scrub dominated by low growing bramble are also present within open areas immediately east of woodlands 1	Local	Very low as a common and widespread habitat of only local importance. Very tolerant to change.

Habitat	Brief description and valuation	Geographical Importance	Receptor Value
	and 2 respectively. Dairyborn Scarp DWS has extensive areas of dense scrub mostly dominated by hawthorn, elder and bramble on the steep areas of west facing escarpment. This habitat does not qualify as a habitat of principal importance and is therefore of local importance. This habitat is likely to have interest for faunal species.		
Semi-improved neutral grassland	Species rich and species poor semi-improved neutral grassland habitat is the dominant grassland habitat type within the Main Application Site. The largest areas of this habitat were previously associated with the southern part of Wigmore Park and four set aside areas within arable fields. NVC surveys of the set aside areas identified species composition characteristic of MG1 *Arrhenatherum elatius* grassland with MG1a *Festuca rubra* and MG1b *Urtica dioica* sub-communities, and MG6 *Lolium perenne – Cynosurus cristatus* grassland with MG6a typical sub-community. Other grassland headlands around arable fields could not be classified to any particular NVC community and were instead mapped as Neutral grassland – unclassified. Elsewhere this habitat was fragmented and present adjacent to hedgerows, roadside verges or areas of unmanaged habitat within the airfield. Since the 2018 surveys were conducted, a number of previously arable fields within Area G have been sown with a grass seed mix and managed. These extensive fields have been allowed to become vegetated and as a result the floral communities are relatively diverse, and they have now been classified as semi-improved grassland. The grassland qualifies as lowland meadow, a habitat of principal importance and a conservation priority of the Bedfordshire and Luton LBAP, neutral grassland is a conservation priority of the Hertfordshire LBAP. The semi-improved	District	Low due to being a more common habitat within the District and has tolerance for change.

Habitat	Brief description and valuation	Geographical Importance	Receptor Value
	neutral grassland within the Proposed Development site is of district value.		
Calcareous grassland	Calcareous grassland was less apparent than anticipated within the study area which was mostly restricted to small areas of disturbed ground/calcareous exposures, including highway cutting embankments where not scrubbed over (latter observed during 2018 surveys). The exceptions were a restricted grassland area east of Dairyborn Scarp DWS, on a rabbit (*Oryctolagus cuniculus*) grazed south-facing slope within arable land and at the south-western periphery of the airport runway. An area of calcareous grassland was present within the Main Application Site at the south western periphery of the airport however during 2020 large areas of this were noted to be encompassed by the construction footprint of the Luton DART (described in **Chapter 2** of the ES **[TR020001/APP/5.01]**). Whilst access to this active construction area was restricted, it appeared unlikely that significant areas remained due to the scale of the works, though representative species could persist on and around the steep exposed chalk slopes to the north and west of this construction area. Other smaller areas of this habitat are restricted to disturbed ground and calcareous exposures including areas of MG6c *Lolium perenne – Cynosurus cristatus/ Trisetum flavescens* sub-community within arable headlands. Lowland calcareous grassland is a habitat of principal importance and a conservation priority of the Bedfordshire and Luton LBAP and Hertfordshire LBAP. The calcareous grassland within the Proposed Development site is of district value.	District	Medium due to being a rarer habitat within the District, with a lower tolerance for change.
Poor semi-improved grassland	Species-poor grassland forms most of the grassland habitats within the airport complex and at the bases of the hedgerows within Area C, areas of low diversity grassland associated with fallow fields or areas of set aside. These areas	Local	Very low as a common and widespread habitat of only local

Habitat	Brief description and valuation	Geographical Importance	Receptor Value
	are either dominated with perennial rye grass (*Lolium perenne*), false oat-grass (*Arrhenatherum elatius*) or smooth meadow grass (*Poa pratensis*); or are dominated by red fescue (*Festuca rubra*) and/or false oat-grass but are relatively species-poor examples. Grassland 16 (Ecology Baseline Report **(Appendix 8.1** of this ES **[TR020001/APP/5.02]**)) is a large expanse of undulating set-aside between arable fields due west of Winch Hill. Grassland 17 is an area of set-aside located to the east of Winch Hill within the Main Application Site. This habitat does not qualify as a habitat of principal importance but is likely to have interest for faunal species.		importance. Very tolerant to change.
Arable and arable field margins	Large arable fields were present to the east and west of Winch Hill at the east of the Main Application Site. Several of the larger fields west of Winch Hill had associated arable plant species which included some notable species, but have since been taken out of agricultural use from 2018 to 2020, with some sown and now establishing as grasslands. The field to the north of Woodland 1 and Grassland 5 has also been taken out of agricultural use and has been colonised by a range of agricultural associated species with patches of bare ground. Fewer arable weeds are associated with the fields east of Winch Hill possibly due to current herbicide application practices at the field edges. Arable field margins are a habitat of principal importance and a conservation priority of the Bedfordshire and Luton LBAP and the Hertfordshire LBAP. While the majority of the arable fields are of negligible ecological value, the arable field margins within the Proposed Development site are of district value.	District	Low due to being a more common habitat within the District and tolerant to change.
Ponds	Within the Main Application Site there are ten named pond habitats, with a further ten	Local	Low as a fairly common

Habitat	Brief description and valuation	Geographical Importance	Receptor Value
	ponds within 500m (**Figure 8.3** of this ES **[TR020001/APP/5.03]**). Two Thames Water surface water attenuation ponds are present to the north-east of Wigmore Park (Pond 1) and north of Wigmore Park (Pond 2). These ponds have no apparent aquatic vegetation and limited marginal vegetation. Ponds 5, 6, 8, 9, 13, 14 and 15 are present within the airport infrastructure and are associated with airfield drainage or used as fire training pools. Pond 12 is situated within semi-improved neutral grassland habitat at the western side of Wigmore Park. In mid-2018, this appeared to be very shallow, recently formed and regularly dries. None of the pond habitats present and subject to amphibian surveys, qualify as the priority habitat due to the absence of diverse macrophytes, and a lack of notable plant or faunal species.		habitat of local importance, but mainly poor examples within the Main Application Site.

Species

8.7.11 The habitats within and directly adjacent to the Main Application Site support a wide range of plant and animal species, including protected and notable species. A summary of the species present through surveys undertaken between 2018 to 2022 is provided in **Table 8.14**. The results of the baseline surveys are provided within the Ecology Baseline Report (**Appendix 8.1** of this ES **[TR020001/APP/5.02]**).

Table 8.14: Notable species present/surveyed and considered of relevance to the assessment

Species/ species group	Brief description	Geographical Importance	Receptor Value
Orchids	Field surveys identified that populations of common spotted orchid (*Dactylorhiza fuchsii)*, pyramidal orchid (*Anacamptis pyramidalis)*, bee orchid (*Ophrys apifera*) and common twayblade (*Neottia ovata*) are present at Wigmore Park CWS within the Main Application Site and are included on the citation for Wigmore Park as a CWS. Common spotted orchid are also present within an area of semi-improved grassland set-aside at the	District	Medium due to being of district value but limited tolerance to change unless under

Species/ species group	Brief description	Geographical Importance	Receptor Value
	edge of an arable field within the area of proposed provision of open space in the Main Application Site. They were found to be present in grasslands 5, 8, 9, 10 and between 10 and 12 (Appendix **B1 and C1** in the Ecology Baseline Report, **Appendix 8.1** of this ES **[TR020001/APP/5.02]**). Bee orchid records were provided for Luton Parkway verges DWS, and were noted to be present in grassland 11. Common twayblade were found within dense scrub as target note 6. The orchid assemblage within the Proposed Development, includes a high number of individual plants and given that the population is relatively isolated within an urban and intensive agricultural landscape the orchid assemblage is of district value.		correct conditions.
Arable plants	The margins of the arable fields within the Main Application Site supported a diverse range of species including notable arable plants. These include common poppy (*Papaver rhoeas)*, yellow rattle (*Rhinanthus minor)*, cornflower (*Centaurea cyaneus*) and field madder (*Sherardia arvensis)*. Cornflower, along with other arable plants present, are species of principal importance and also an England Red List species (Ref. 8.55). Several of the larger fields west of Winch Hill have been taken out of agricultural use from 2018 to 2020, with several sown and establishing as grasslands. Arable plants are a conservation priority of the Bedfordshire and Luton LBAP, cornflower is a conservation priority of the Hertfordshire LBAP. The arable plant assemblage within the Proposed Development site is of district value.	District	Low due to comprising mainly more common species within the District and being tolerant to change as they grow on changing habitats and can colonise bare ground.
Invasive species	Desk studies identified the presence of invasive species within the Main Application Site. Field surveys confirmed the presence of Japanese knotweed (*Reynoutria japonica*) (Target Note 7, Woodland 7 and Woodland 10 (Appendix **B1 and C1** in the Ecology Baseline Report, **Appendix 8.1** of this ES **[TR020001/APP/5.02]**), Japanese rose (*Rosa rugosa*) and invasive cotoneaster species wall	N/A	Very low, highly adaptable and undesirable species.

Species/ species group	Brief description	Geographical Importance	Receptor Value
	cotoneaster (*Cotoneaster horizontalis)*, Himalayan cotoneaster (*C.simonsii*) and small-leaved cotoneaster (*C.microphyllus*). Japanese rose and Japanese knotweed were identified within and around Wigmore Park. Cotoneaster species were identified within the amenity areas of Wigmore Park and throughout the business and industrial estate to the north of the airport. Records also showed presence of Japanese knotweed in Dairyborn Scarp DWS and Wigmore Park CWS. These species are all listed as non-native invasive species within Schedule 9 part II of the Wildlife and Countryside Act (as amended) 1981 and the Invasive Alien species (Permitting and Enforcement) Order 2019 (Ref. 8.14). The invasive species within the Proposed Development have no value.		
Badger	The Main Application Site includes woodland, hedgerow and grassland habitats suitable for badger foraging, dispersal and sett building. Field surveys identified high levels of badger activity across the Main Application Site and immediately adjacent land. Four main setts have been identified within the Main Application Site, with one additional main sett lying outside (Confidential Badger Survey Plan in **Appendix F1** of **Appendix 8.1** Ecology Baseline Report of the ES **[TR020001/APP/5.02]**). No main setts fall within main areas of works, but three active and one disused main setts are located adjacent, and/or within areas of habitat creation. In addition, two active and one disused annexe setts, two active and one disused subsidiary setts, and 13 active and ten disused outlier setts were found. No evidence of badger activity was found within the Off-site Car Park areas. A badger bait marking survey confirmed the presence of four distinct badger groups, of which the core territory of two groups fall within the Main Application Site. No territory was noted for the main sett outside of the site, so it is assumed that it falls further to	Local	Low due to being a common and widespread species which are highly adaptable.

Species/ species group	Brief description	Geographical Importance	Receptor Value
	the east and south and outside the area surveyed. The badger groups within the Proposed Development are of local value.		
Bats	The Main Application Site includes a range of suitable foraging and commuting habitats for bats including semi-improved grassland, waterbodies, scrub, hedgerow and woodland. Trees and buildings within the Main Application Site also offer roosting opportunities for bats. Field activity surveys between 2016 and 2021, identified key commuting routes for common bat species along the wooded belts that run between Wigmore Park and the adjacent arable fields to the east, and along the green lane within Wigmore Park CWS that connects to Winch Hill Wood ancient woodland and divides the airport runway from the arable fields to the east. Bat species recorded in 2016 utilising habitats within Wigmore Park and at the east of the Main Application Site included common pipistrelle, soprano (*Pipistrellus pygmaeus*) and Nathusius' pipistrelle, (*Pipistrellus nathusii*), noctule (*Nyctalus noctule*), Leisler's bat (*Nyctalus leisleri*), serotine (*Eptesicus serotinus*), Myotis species, brown long-eared (*Plectotus auratus*) and barbastelle (*Barbastella barbastelleus*). Further field surveys within the Main Application Site undertaken between 2018 and 2019 included ground-based assessments of tree and building roost features, tree climbing inspections of potential tree roost features, emergence and re-entry surveys of potential bat roost features and trapping surveys within key woodland areas within the Main Application Site. Updates were undertaken in 2020, along with assessment of buildings within the footprint of the AAR, and back tracking surveys were also conducted in August 2020 on the ridgeline of the woodland in the centre of the Proposed Development, and the Winch Hill Wood Ancient woodland	District for bat assemblage, Local for roosts on site.	Medium for bat assemblage as includes both common and rarer species. Low for roosts on site as for small roosts of a common, widespread and opportunistic species.

Species/ species group	Brief description	Geographical Importance	Receptor Value
	east of the boundary. Further static detector activity surveys were undertaken in 2021. Four trees (T104, T120, T124, T126), were identified as supporting common pipistrelle bat roosts within the Main Application Site of the Proposed Development. All four trees were classed as summer day roosts for low numbers of common pipistrelles, ranging from zero to three bats in a survey, with none observed on several visits. A further two small common pipistrelle bat roosts were identified within buildings (Pillbox and Winch Hill Cottage (2)) adjacent to the Main Application Site, that will not be directly affected. The Pillbox is surrounded by trees which will be retained, and Winch Hill Cottage (2) is set behind woodland from the Main Application Site. Low numbers of bats were confirmed with a maximum survey count of one bat for both buildings, though they could also offer hibernacula potential. Soprano pipistrelle, noctule, brown long-eared bats and barbastelle are species of principal importance and Natterer's bat are a conservation priority of the Hertfordshire LBAP. The bat assemblage predominantly comprises common and widespread species, however with the presence of less common species such as serotine, and myotis sp, the bat assemblage within the Proposed Development is of district value. Barbastelle was also found to be present, however due to the very low numbers of barbastelle recorded it is not considered to be a key or valuable habitat for this species. Due to only single or low numbers of common pipistrelle summer days roosts being confirmed on site, the value of the roosts on site is considered to be of local value for small roosts of a common and widespread species. The details of the bat surveys are provided within the Ecology Baseline Report (**Appendix 8.1** of this ES **[TR020001/APP/5.02]**).		
Hazel dormouse	The Main Application Site supports small semi-natural broadleaved and plantation woodlands, areas of scrub and hedgerows that have some	N/A	N/A

Species/ species group	Brief description	Geographical Importance	Receptor Value
	connectivity to the network of hedgerows and woodlands within the wider landscape. These habitats have the potential to support hazel dormouse, however it is noted that the wider landscape comprises intensively managed arable land and many of the hedgerows within the network are gappy and heavily flailed. This could limit the ability for hazel dormouse present to disperse across the landscape and colonise new habitats. A review of desk study data returned no recent records of hazel dormouse within 2km of the Main Application Site. However, a historic record exists in the new park area to the east, recorded in 1995, and hazel dormouse have been recorded within Laysbury Dells LWS in 1996, over 1km south east. Hazel dormouse are a species of principal importance and a conservation priority of the Hertfordshire LBAP. Dedicated field surveys undertaken 2018 across the Main Application Site did not identify any evidence for the presence of hazel dormouse. This species is therefore assumed to be absent from the Main Application Site. The scope, methodology and results of the survey completed are included within the Ecology Baseline Report (**Appendix 8.1**of this ES **[TR020001/APP/5.02]).** Dormouse are therefore considered to be absent and not discussed further in this assessment.		
Riparian mammals	A review of desk study data returned no recent records of otter or water vole within 2km of the Main Application Site. Consideration was given to the presence of these species during the assessment of habitats within the Main Application Site. Given the heavily engineered nature of the ponds within the Main Application Site and their poor connectivity to other waterbodies or watercourses, the habitats within the Main Application Site were not considered suitable to support riparian mammals such as otter or water vole.	District	Medium due to district value species, that are sensitive to changes in their habitats.

Species/ species group	Brief description	Geographical Importance	Receptor Value
	However, a historic record of water vole exists from the River Lea, recorded in 1995, and water vole are included within the citation for the River Lea CWS, located 270m to the west of the Main Application Site. The Off-site Highway Interventions for the Proposed Development include the A1081 and gyratory junction, which cross the River Lea. Surveys of the River Lea and associated minor watercourses within proximity to the Proposed Development, undertaken in 2019 and 2022 identified the presence of otter field signs but not holts on the stretch of the River Lea downstream of the A1081, away from potential effects resulting from the works. Otter may utilise any of the other watercourses within the study area but given the lack of prey and sheltering opportunities, it is considered likely that this is only transiently to commute between areas of more suitable habitat. This stretch of the River Lea was also assessed as supporting habitats of moderate suitability for water vole, however no definitive field signs to confirm presence were identified. A single small mammal burrow was recorded, however in the absence of other field signs it is considered too ambiguous to derive presence. Water vole and otter are species of principal importance and a conservation priority of the Bedfordshire and Luton LBAP and the Hertfordshire LBAP. The otter population using the stretch of the River Lea that is crossed by the Proposed Development is of district value. The details of the riparian mammal surveys are provided within the Ecology Baseline Report (**Appendix 8.1** of this ES **[TR020001/APP/5.02]**).		
Other mammals	The desk study revealed several records of brown hare (*Lepus europaeus*), hedgehog (*Erinaceus europaeus*) and one of polecat (*Mustela putorius*) within proximity to the Main Application Site, but no new records. The Main Application Site supports open grassland, scrub, hedgerows and woodland habitats that	Local	Very low due to being of local value, limited protection and

Species/ species group	Brief description	Geographical Importance	Receptor Value
	are likely to be used for foraging, shelter and as dispersal corridors by a range of mammals potentially including these species. Field surveys undertaken between 2016-2021 recorded incidental sightings of brown hare and hedgehog within the Main Application Site and taking a precautionary approach polecat are also considered likely to be present. No new sightings were noted during 2022 surveys. Brown hare, hedgehog and polecat are species of principal importance. The brown hare, hedgehog and polecat populations within the Proposed Development site are of no more than local value.		adaptable to the proposed changes.
Breeding birds	The desk study revealed multiple records of breeding birds within the study area, those of relevance to the assessment include 14 Red List species such as skylark (*Alauda arvensis*), linnet (*Linaria cannabina*) and yellowhammer (*Emberiza citronella)*, eight Amber List species such as kestrel (*Falco tinnunculus*), willow warbler (*Phylloscopus trochilus*) and bullfinch (*Pyrrhula pyrrhula*). Refer to the Ecology Baseline Report (**Appendix 8.1** of this ES **[TR020001/APP/5.02]**) for full lists. The Main Application Site includes woodland, scrub, hedgerows, semi-improved grassland and arable land that are utilised by a range of common bird species for foraging and nesting. During 2018 and 2019, a total of 23 breeding species and 86 breeding territories were recorded across both transects, including three Red List species and four Amber List species. During the 2021 surveys, a total of 20 breeding species and 86 breeding territories were recorded, including three Red List species and two Amber List species. Of these, Red and Amber List species were represented by less than ten breeding territories with the exception of skylark with 12 territories in 2018 and 11 in 2021. The species assemblage is typical of the habitats present. The breeding bird assemblage within the Proposed Development site is of local value.	Local	Low due to being typical of these habitats so of local value, and adaptable to the proposed changes.

Species/ species group	Brief description	Geographical Importance	Receptor Value
Wintering birds	The desk study revealed multiple records of wintering birds within the study area, those of relevance to the assessment include 19 Red List species such as grey partridge (*Perdix perdix*), starling (*Sturnus vulgaris*), linnet and skylark and nine amber list species such as redwing (*Turdus iliacus*), yellow-legged gull (*Larus michahellis*), stock dove (*Columba oenas*) and meadow pipit (*Anthus pratensis*). Refer to the Ecology Baseline Report (**Appendix 8.1** of this ES **[TR020001/APP/5.02]**) for full lists. The Main Application Site includes a range of habitats, most notably the amenity and semi-improved grasslands that support over-wintering populations of birds. Field surveys identified a total of 55 species, including eleven Red List and 16 Amber List species. These species are largely typical of the habitats present, but included a notable flock of approximately 220 linnet, a Red List species within the arable set-aside east of Wigmore Park. A golden plover (*Pluvialis apricaria*) flock frequented the bean fields at Tankards Farm, Tea Green approximately 500m north-east of the Main Application Site, only two were observed flying over the Main Application Site. The wintering bird assemblage within the Proposed Development site is of district value.	District	Low due to being of district value, and being adaptable to the proposed changes.
Schedule 1 birds (Ref. 8.10)	The desk study revealed records for Schedule 1 species barn owl and red kite within the study area. The desk study also revealed wintering records of red kite and barn owl. Barn owl and red kite have been recorded using the habitats within the Main Application Site as a foraging resource. Barn owl presence was confirmed during field surveys between 2016 and 2018 through the identification of pellets within the Main Application Site, and red kite were observed during field survey work. Further surveys undertaken in 2019 within 1.5km of the Main Application Site identified the presence of two red kite occupied nests and another territory, within woods to the south	County	Medium due to being of county value, that are sensitive to changes in their habitats and disturbances.

Species/ species group	Brief description	Geographical Importance	Receptor Value
	east of the Main Application Site. The surveys also identified the presence of a barn owl occupied nest to the south of the Main Application Site, and a separate barn owl breeding territory to the east of the Main Application Site. The barn owl and red kite populations utilising the habitats within and adjacent to the Proposed Development site are of county value as they are widespread species despite their level of protection for breeding sites, and their use of regularly occurring lowland habitats on the site which is representative within the county. No breeding territories of Schedule 1 species were recorded during 2021 during the general breeding bird transect surveys.		
Reptiles	A review of the desk study data identified one record of slow-worm (*Anguis fragilis)* within 1km of the Main Application Site in the last 10 years. Some additional historic records (between 1973 and 2007) of common lizard (*Zootoca vivipara*), grass snake (*Natrix helvetica*) and slow worm were also returned. The Main Application Site includes grassland, scrub, hedgerows and waterbodies suitable for reptile foraging, dispersal and shelter by reptiles. Field surveys undertaken during 2018 and 2019 identified two low populations of slow worm within grassland margins adjacent to Wigmore Park allotments, and within a small area of unmanaged calcareous grassland to the east of Wigmore Park; both of which are within the Main Application Site. An additional nine surveyed areas yielded no results. Given the habitats present on site it is also considered possible that grass snake are present in low numbers. Slow-worm and grass snake are species of principal importance. The reptile populations within the Proposed Development site are of local value.	Local	Low due to being of small populations of local value, and being adaptable to the proposed changes.
Amphibians	A review of the desk study data confirmed the presence of common toad (*Bufo bufo),*	Local	Low due to being of

Species/ species group	Brief description	Geographical Importance	Receptor Value
	common frog (*Rana temporaria*), and smooth newt (*Lissotriton vulgaris*) within the wider landscape, no recent great crested newt records were received for within the study area. Twenty ponds are present within the study area, shown on Appendix X1, of the Ecology Baseline Report (**Appendix 8.1** of this ES **[TR020001/APP/5.02]**), but only wet ponds within 500m of the Main Application Site that were accessible and not on the far side of a dispersal barrier were subject to surveys. There are nine ponds within the Proposed Development, two of which are not within areas of works and will be retained. Therefore the areas affected by the works within the Main Application Site includes seven ponds with associated grassland, woodland, scrub and hedgerow habitats suitable for amphibians. Field surveys undertaken in 2018, 2019 and 2020 identified a small population of smooth newt utilising eight of the ponds and associated habitats, six of which lie within the Main Application Site. The presence of common toad was also confirmed within the Main Application Site during reptile surveys. Field and environmental DNA (eDNA) surveys revealed negative results for great crested newts. This species is therefore assumed to be absent and is not discussed further within this assessment. Common toad are species of principal importance. The amphibian populations within the Proposed Development site are of local value.		small, common and widespread species of local value, and being adaptable to the proposed changes.
Roman snail	The Main Application Site includes calcareous grassland habitats with an associated mosaic of scrub, woodland and hedgerows which offer suitable foraging and shelter habitats for Roman snail. Field surveys undertaken [redacted] of the Ecology Baseline Report (**Appendix 8.1** of this ES	Local	Low due to being of small and local value, and being adaptable to the proposed changes.

Species/ species group	Brief description	Geographical Importance	Receptor Value
	[TR020001/APP/5.02]). A further record was associated with [redacted]. Dedicated surveys undertaken in 2019 and 2020 to confirm the extent of the Roman snail population did not identify any live Roman snail within the Main Application Site, [redacted] In addition, an empty shell fragment was identified [redacted] in 2020. Given the historic record from this site and the fragment identified, low numbers of Roman snail are assumed to be present on a precautionary basis in the absence of a full survey. The Roman snail population utilising the habitats [redacted] re of local value.		
Other invertebrates	The Main Application Site includes a mosaic of habitat types including calcareous and neutral grasslands, bare/disturbed ground, scrub, hedgerows, woodland and waterbodies. This sits within a wider landscape of connected hedgerows, field margins and woodland. Such habitats offer opportunities for a range of invertebrate species. Field surveys undertaken in 2015-2016 and 2018-2019 identified an invertebrate assemblage comprising 1,550 species, 91 of which are regarded as 'Key Species' (i.e. with rare, scarce, threatened or near threatened conservation status). Updated surveys undertaken in 2021 on smaller more focussed areas recorded 331 species of invertebrate, covering a wide range of taxonomic groups. Twenty-one species from the species list of 331 are regarded as 'Key Species'. For further details refer to **Appendix BB1** of the Ecology Baseline Report **Appendix 8.1**, of the ES **[TR020001/APP/5.02]**. The assemblage includes the presence of the rare picture-winged fly (*Dorycera graminum)*, set-aside downy-back beetle (*Ophonus laticollis)* and dingy skipper butterfly (*Erynnis tages)* all of which are species of principal importance.	County	Medium due to being of county value, with species which are sensitive to changes in their habitats.

Species/ species group	Brief description	Geographical Importance	Receptor Value
	Beetles were particularly prevalent; of the 570 species of beetle recorded, 49 have no previous Bedfordshire record and 11 have no previous Hertfordshire record. The assemblage of invertebrates utilising the habitats within the Proposed Development is of county value.		

Future baseline

8.7.12 In the absence of the Proposed Development, there is likely to be a change to the future baseline conditions as a result of other factors and developments in proximity to the Application Site. These are the conditions that would prevail 'Without Development' in place. The 'Without Development' scenario is used, where appropriate, as a comparator for the assessed case, to show the effect of the Proposed Development against an appropriate reference point. The approach to defining future baseline and the developments identified for consideration are described in **Section 5.4** of **Chapter 5** of this ES **[TR020001/APP/5.01]**.

8.7.13 Construction of work in assessment Phase 1 of the Proposed Development would be likely to commence in 2025 and be completed in 2027. Within these timescales, or even if construction did not commence until year five following grant of the DCO, there are not expected to be any significant changes in the habitats and species present. Factors that would influence species populations within the survey area include prevailing food availability, habitat suitability, disturbance and weather conditions. These factors are not considered likely to change notably within the timescales considered. In addition, no substantial change in population trends were noted for any species over the course of the surveys undertaken, ranging for some species from 2016 to 2022. Whilst natural fluctuations in some species populations are common in relation to external influences, such as good or poor years for butterflies including the dingy skipper, populations are not anticipated to change materially within the Application Site in this timeframe.

8.7.14 A number of the fields to the east of Wigmore Park CWS were previously in use as arable fields, but have since been sown with a grass seed mix and managed, in anticipation of the New Century Park planning permission (LBC ref: 17/02300/EIA), for which further details are provided in **Section 2.4** of **Chapter 2** of this ES **[TR020001/APP/5.01]**, and have been reclassified as other habitats including semi improved neutral grassland and ephemeral. Without the Proposed Development going ahead, or if it is subject to long delays, these fields could be returned to use as arable or succession of the habitat could occur if they are not returned to this. Succession could lead to improved habitats attracting other protected species and improving the overall biodiversity value of the site. The assessment is based upon the existing baseline for the Proposed Development and the fields currently as classified as semi-improved

neutral grassland and ephemeral habitats, and not the previously arable fields. If the Proposed Development did not go ahead it is likely that the New Century Park development would proceed as consented, and these fields would be maintained as lower biodiversity value amenity parkland.

8.8 Embedded and good practice mitigation measures

8.8.1 This section describes the embedded and good practice mitigation for biodiversity that has been incorporated into the Proposed Development design or assumed to be in place before undertaking the assessment. A definition of these classifications of mitigation and how they are considered in the EIA is provided in **Chapter 5** of this ES **[TR020001/APP/5.01]**.

Embedded

8.8.2 The Proposed Development has been designed, as far as possible, to avoid effects on biodiversity through option identification, appraisal, selection and refinement.

8.8.3 The design of the Proposed Development and the planned approach to its construction have been developed with an overarching principle of avoidance where possible, for example avoiding loss of ancient woodland within Winch Hill Wood (Woodland 6) (shown in **Appendix B1** of the Ecology Baseline Report, **Appendix 8.1** of the ES **[TR020001/APP/5.02]**).

8.8.4 Mitigation measures have been integrated (embedded) into the Proposed Development for the purpose of minimising effects related to ecological receptors. These measures focus on implementing the mitigation hierarchy where possible to minimise the effects.

8.8.5 A summary of measures that have been embedded into the design of the Proposed Development through design iterations are set out below.

a. The landscape design for the Proposed Development will include large areas of habitat creation to partially mitigate the loss of habitats from construction of the Proposed Development. Areas of habitat creation will be designed and managed to ensure their target condition exceeds that of the habitats lost and thereby contributes to achieving at least a 10% net gain in biodiversity (refer to the Biodiversity Net Gain (BNG) Report, **Appendix 8.5** of this ES **[TR020001/APP/5.02]**).

b. Much of the habitat creation referred to above is included within a large area of provision of open space, which will be created within the north east of the Main Application Site (as shown on **Figure 14.11** of this ES **[TR020001/APP/5.03]**). This provision of open space will connect to the retained areas of Wigmore Park, providing east west connectivity within the Main Application Site and wider landscape. This area of open space will include habitat creation measures to mitigate for those habitats lost within Wigmore Park CWS. The replacement habitat, once established, will mitigate for the loss of these foraging, dispersal and shelter habitats which are used by a range of species including badger, bats, birds, reptiles, amphibians and invertebrate species. Whilst the provision of open space will be open to the public, other areas of habitat provision will not be. In addition the provision of open space is designed with footpaths to direct the public away from habitats in the rest of the area.

c. Additional areas of embedded habitat creation include areas of habitat with the Terminal Approach (as shown in **Figure 14.12** of this ES

[TR020001/APP/5.03]), within and around Dairyborn Scarp DWS in assessment Phase 2a. This would replace habitats lost with scrub, neutral meadow grassland, and exposed chalk on lower lying shallow slopes, along with management of existing woodland. Landscape restoration will comprise species rich hedgerows with trees adjacent to Winch Hill Road and on the eastern boundary to the east of the road in assessment Phase 1. Further landscape restoration within assessment Phase 2b will include regrading and providing mitigation on top and to the east of the platform embankment east of the runway, by creating amenity grassland, broadleaved woodland, neutral meadow grassland and calcareous grassland, along with additional species rich hedgerows with trees.

d. The measures to establish, manage and monitor areas of habitat creation within the Proposed Development are detailed within the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**). The Outline LBMP has been developed in consultation with local stakeholders (listed in **Section 8.4** above) and includes details for implementation, establishment, maintenance and monitoring of created/enhanced habitats. It provides detailed management and monitoring requirements for the first five years from time of planting, for a period of 50 years, with a requirement for review initially every five years, to ensure that management is appropriate and habitats created/enhanced are in line with those proposed. In addition, the Outline LBMP includes appropriate measures to control recreational pressures on the habitats within the open space such as litter, trampling and disturbance.

e. Grassland habitats [redacted] will continue to be managed as they are, from now and through to operation of the Proposed Development (as part of the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**)), at a short sward height to avoid the establishment of rough grassland and scrub. This would continue to discourage encroachment of Roman snail [redacted] where they would then be at risk of being killed without additional mitigation. As such, given their legal protection, any encroachment would subsequently represent a constraint to the construction and operation of the Proposed Development.

f. The Proposed Development has incorporated a buffer of semi-natural habitats, at least 15m in width, around areas of ancient woodland within or adjacent to the Proposed Development (Arboricultural Impact Assessment, **Appendix 14.3** and CoCP, **Appendix 4.2** of this ES **[TR020001/APP/5.02]**). No ground works will be permitted within this buffer to ensure trees within ancient woodland are protected from root damage and soil compaction. This is in accordance with Natural England guidance (Ref. 8.56).

g. The Proposed Development has been designed to retain veteran/ancient trees where possible (Arboricultural impact assessment, **Appendix 14.3,** Outline LBMP, **Appendix 8.2** of this ES, and CoCP, **Appendix 4.2** of this

ES **[TR020001/APP/5.02]**). Where such trees have been retained within or directly adjacent to the Proposed Development a buffer zone will be established to protect the roots. The buffer zone around an ancient or veteran tree will be at least 15 times larger than the diameter of the tree, the buffer will also be at least 5m from the edge of the tree's canopy (if that area is larger than 15 times diameter) (Ref. 8.57). Veteran trees offer important habitats for a range of species including rare saproxylic invertebrates and fungi. Felled dead wood from potential veteran/ancient trees that could be lost will be kept in as large sections as possible and incorporated into the landscape design of the new areas of habitat creation within the open space. Large sections of felled trunks will be reinstalled vertically in the ground within the habitat creation areas to create 'monoliths' where possible, which will encourage the deadwood to decay in a similar way to how it would naturally as standing deadwood in-situ.

h. The Proposed Development will incorporate an area of new habitat, within the area of provision of open space in the eastern section of the Main Application Site, and newly created habitat in the north east of the Main Application Site, as shown in the Landscape Mitigation Plans **Figures 14.11 to 14.13** of this ES **[TR020001/APP/5.03]**, to mitigate the loss of grassland supporting orchids. This replacement habitat will be designed with consideration to soil conditions, geology and local topography, and will be managed to replicate the requirements of the orchid species present (Outline LBMP, **Appendix 8.2** of this ES **[TR020001/APP/5.02]**).

i. Where woodland and hedgerow belts are being retained within the Proposed Development design, the adjacent arable margins will also be retained. These margins will be managed to encourage retention and proliferation of the notable arable plant species and invertebrates that have been identified within the survey area as part of the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**).

j. The Proposed Development will incorporate artificial bat roosting provision on buildings and retained trees to mitigate the roosting opportunities lost to the Proposed Development as part of the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**) and the Bat Mitigation Strategy (**Appendix 8.8** of this ES **[TR020001/APP/5.02]**).

k. The landscape mitigation has been designed to be appropriate given its proximity to the airport and the potential that certain types of habitat creation could attract additional birds and thereby increase the bird strike risk. Newly created habitats will be managed appropriately for their proximity to the airport's airspace to ensure the risk of bird strike does not significantly increase (a Bird Strike Risk Assessment is provided as **Appendix 8.4** of this ES **[TR020001/APP/5.02]**).

l. As far as possible, the Off-site Car Parks at Luton Parkway will be designed to minimise loss of adjacent Luton Parkway Verges DWS (Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**) and habitats that could support protected species and important habitats.

Good Practice

8.8.6 A summary of best practice measures (mitigation which will be in place as a result of standard good practice and due to legislative requirements) are set out below and are included within the CoCP (**Appendix 4.2** of this ES **[TR020001/APP/5.02]**):

a. The assessment assumes implementation of measures described within the CoCP (**Appendix 4.2** of this ES **[TR020001/APP/5.02]**) including control of dust, control of water quality, control of noise and light pollution, management and eradication protocols for invasive species such as Japanese knotweed, protection of adjacent water courses and erection of tree protection fencing to ensure root protection zones are adhered to.

b. Any vegetation clearance required for construction of the Proposed Development will be undertaken at an appropriate time of year to avoid impacts to legally protected species where possible. Where appropriate or timing avoidance is not possible, supervision of vegetation clearance by a suitably qualified ecologist will be undertaken to avoid injuring or killing protected species such as nesting birds, reptiles, and amphibians.

c. Pre-construction surveys will be conducted to establish any subsequent changes to the results, such as newly created badger setts.

d. Obvious mammal trails would be kept clear of obstructions where possible.

e. The Proposed Development will incorporate directional lighting methods such as smart LED lighting with integrated baffles, cowls or hoods, to avoid light spill onto retained and adjacent habitats and the species they support, notably Winch Hill Wood ancient woodland and nocturnal species such as bats and badger.

f. Minimising working areas and vegetation clearance within designated nature conservation sites and areas of protected habitat to only that essential for works.

g. Demarcation of non-working areas within designated nature conservation sites and areas of protected habitat and close to sensitive species to protect habitat.

h. Retained woodlands, hedgerows and trees will be protected by clearly defined root protection areas to prevent damage/compaction of roots by plant and other machinery.

i. Reducing the severance impact of vegetation removal by maintaining the feature intact as long as possible, keeping any gap to the minimum required for the purpose and considering filling gaps with brash or similar when work is not being undertaken (e.g. on a bat commuting route at night) so that it can continue to function as a wildlife corridor.

8.9 Assessment

8.9.1 This section presents the results of the assessment of likely significant effects with the embedded and good practice mitigation measures, described in the previous section, in place. This assessment is made prior to additional mitigation being applied, as per **Section 8.10**, and before residual effects are then presented in **Section 8.11**.

8.9.2 A summary of the assessment of full effects is provided in **Table 8.17** in **Section 8.14**. Significant effects, and those deemed appropriate and/or require additional explanation/detail, have been extracted and are discussed in further detail in this section. Please refer to **Section 8.3** for details of how this section is structured, in particular Temporal Scope.

Construction

Designated nature conservation sites

Wigmore Park CWS

Assessment Phase 1

8.9.3 The assessment Phase 1 construction works for the Proposed Development will result in the loss of c.11.5ha (74.6%) of Wigmore Park CWS, including semi-improved neutral grassland, calcareous grassland and hedgerow habitats for which the site is designated, through site clearance and creation of temporary surface car parks. The Proposed Development includes embedded measures to replace those habitats lost within Wigmore Park CWS as part of the enhanced provision of open space totalling 47.6ha (**Chapter 4** of this ES **[TR020001/APP/5.01]**). However, it is recognised that time is required for these new areas of habitat to become established to a level at which they provide an equivalent biodiversity value to that lost to the Proposed Development at Wigmore Park CWS; therefore the Proposed Development does not initially fully mitigate the loss of biodiversity at the CWS in the short term. As such, even with embedded habitat mitigation replacing the equivalent size and habitats in close proximity to the existing CWS, as part of the provision of open space, the majority loss of the key habitats of Wigmore Park CWS to the assessment Phase 1 works for the Proposed Development represents an adverse impact in the short term. This loss could be of high magnitude, on the structure and function of the county value site, which equates to a **major adverse effect**, which is **significant**. However embedded habitat mitigation reduces this to **moderate adverse** in the medium term, which remains **significant,** decreasing to a **minor adverse effect** when vegetation reaches maturity in the long term (within 10-15 years), which is **not significant.**

Assessment Phase 2a

8.9.4 The assessment Phase 2a construction works for the Proposed Development will result in the loss of the majority of the remaining c.2.9ha (18.8%) of Wigmore Park CWS (hedgerows to the north to be incorporated into the open space). The habitat creation measures to replace those lost within Wigmore Park CWS in assessment Phase 1 will have matured to various levels by

assessment Phase 2a, depending on the habitat types. However, it is recognised that time is required for the additional assessment Phase 2a habitat mitigation measures to establish to a level at which they provide an equivalent biodiversity value to that lost to the Proposed Development at Wigmore Park CWS, therefore the Proposed Development does not yet fully mitigate the loss of biodiversity at the CWS. The further loss of the key habitats of Wigmore Park CWS to the assessment Phase 2a works for the Proposed Development represents a permanent adverse impact of medium magnitude (smaller loss at this assessment Phase and already matured replacement habitat from assessment Phase 1) on the structure and function of the county value site. This equates to a **moderate adverse effect**, which is **significant** in the short term decreasing to a **minor adverse effect** when vegetation reaches maturity in the long term (within 10-15 years), which is **not significant.**

Assessment Phase 2b

8.9.5 Wigmore Park CWS is almost entirely lost (93.4%) to previous construction of assessment Phases of the Proposed Development, with a further 5.4% (0.8ha) lost during assessment Phase 2b leading to a 98.7% overall loss. The exception being of hedgerows/tree lines which have been incorporated into the provision of open space. Therefore the assessment Phase 2b construction works for the Proposed Development do not result in additional significant adverse impacts upon Wigmore Park CWS.

Winch Hill Wood CWS/LWS Ancient Woodland

Assessment Phase 1

8.9.6 No significant construction effects are anticipated in assessment Phase 1, refer to the summary of the assessment of effects provided on **Table 8.17** in **Section 8.14**.

Assessment Phase 2a

8.9.7 Winch Hill Wood CWS/LWS is located wholly within the Main Application Site but will not be subject to any direct habitat loss and will therefore be retained within the Proposed Development. It comprises part Ancient Woodland, however the NVC survey included in the Ecology Baseline Report (**Appendix 8.1** of this ES **[TR020001/APP/5.02]**) reports this woodland to be partly of low and partly of low/moderate botanical value. Assessment Phase 2a earthworks to allow extension of the airport platform will result in changes to the topography of the land (outside of the 15m buffer zone to avoid root damage and soil compaction to woodland trees) adjacent to Winch Hill Wood CWS/LWS. These works have the potential to result in changes to the hydrological conditions within the woodland, however the implementation of a drainage strategy as part of the Proposed Development (described in **Appendix 20.4** of this ES **[TR020001/APP/5.02]**) will avoid substantial changes to the existing hydrological conditions within Winch Hill Wood CWS/LWS. Indirect effects related to dust, noise, water pollution will be managed through embedded measures and good practice within the CoCP (**Appendix 4.2** of this ES **[TR020001/APP/5.02]**).

8.9.8 The construction of assessment Phase 2a of the Proposed Development will also result in further isolation of the ancient woodland, through the removal of connected belts of trees and hedgerows, especially those that offer ecological corridors between the habitats. This isolation may result in the loss of dispersal routes for the flora and fauna leading to the degradation of the ancient woodland community that forms the designating feature of Winch Hill Wood CWS/LWS. The Proposed Development includes the provision of habitat creation measures as part of the landscape restoration, including hedgerow, meadow grassland, scrub and woodland, within land which has been intensively managed for agriculture, directly adjacent to Winch Hill Wood CWS/LWS. These measures will reduce the impact of the loss of connecting ecological corridors; however, given the time required for habitats to establish to a level at which they provide an equivalent biodiversity resource to that lost, a temporary adverse impact, of low magnitude, on the structure and function of the county value site. This equates to a **minor adverse effect**, which is **not significant** in the short term decreasing to a **negligible effect** when vegetation reaches maturity in the long term (within 5-15 years), which is **not significant**.

Assessment Phase 2b

8.9.9 No significant construction effects are anticipated in assessment Phase 2b (refer to the summary of the assessment of effects provided on **Table 8.17** in **Section 8.14**).

Dairyborn Scarp DWS

Assessment Phase 1

8.9.10 No significant construction effects are anticipated in assessment Phase 1, refer to the summary of the assessment of effects provided on **Table 8.17** in **Section 8.14**.

Assessment Phase 2a

8.9.11 The construction works for assessment Phase 2a of the Proposed Development would result in the loss of c.1.3ha (20%) of Dairyborn Scarp DWS, including a mosaic of calcareous grassland, dense and scattered scrub and ruderal habitats for which the remainder of the site is designated. The citation also states that there may be a remnant of the ancient Spittlesea Wood left in the DWS but that it does not meet the criteria for a DWS on this habitat type, and it is also not included within the ancient woodland inventory. This small remnant of potential ancient woodland lies mainly adjacent to the site, just outside of the Proposed Development, but may require cutting back overhanging sections along the woodland edge. The Proposed Development includes habitat creation measures to replace those lost within Dairyborn Scarp DWS; however it is recognised that time is required for these measures to establish to a level at which they provide an equivalent biodiversity value to that lost to the Proposed Development at Dairyborn Scarp DWS, therefore the Proposed Development does not initially fully mitigate the loss of biodiversity at the DWS. These measures comprise the management of 0.5ha of existing woodland, the planting of 0.15ha of native scrub, the seeding of 1.1ha of neutral meadow

grassland and the creation of 650m² of exposed chalk on lower-lying shallow slope. The partial loss of the key habitats of Dairyborn Scarp DWS to the assessment Phase 2a works for the Proposed Development represents a temporary adverse impact of medium magnitude on the structure and function of the district value site. This equates to a **moderate adverse effect** in the short term, which is **significant**. Embedded habitat mitigation will reduce this to a **minor adverse effect** when vegetation reaches maturity within 5-15 years, which is **not significant**.

Assessment Phase 2b

8.9.12 No significant construction effects are anticipated in assessment Phase 2b, (refer to the summary of the assessment of effects provided on **Table 8.17** in **Section 8.14**).

Luton Parkway Verges DWS

Assessment Phase 1

8.9.13 No significant construction effects are anticipated in assessment Phase 1, (refer to the summary of the assessment of effects provided on **Table 8.17** in **Section 8.14**).

Assessment Phase 2a

8.9.14 The construction works for assessment Phase 2a of the Proposed Development would result in the loss of c.0.21ha (37%) of Luton Parkway Verges DWS. This DWS remains present in two sections, one section outside of the Proposed Development which would not be directly affected, and one section which lies partly within and partly outside of the Proposed Development, of which an area would be lost during the construction of Car Park 1. It is assumed as a worst case scenario that all of the 0.21ha within the Proposed Development would be lost for the car park and required working areas, however it may be possible during detailed design to retain, or replace and enhance some areas of this verge on the steep slopes up to the existing road (slip road for the A1081). The dominant habitat in the area of the DWS to be affected comprises dense scrub (0.18ha to be lost), with only 0.03ha of neutral semi-improved grassland and no calcareous grassland being lost, the grasslands being the reason for the DWS designation. The Proposed Development includes habitat creation measures to replace those lost within Luton Parkway Verges DWS elsewhere in the Main Application Site, however it is recognised that time is required for these measures to establish to a level at which they provide an equivalent biodiversity value to that lost to the Proposed Development at Luton Parkway Verges DWS, therefore the Proposed Development does not initially fully mitigate the loss of biodiversity at the DWS. The partial loss of the key habitats of Luton Parkway Verges DWS in assessment Phase 2a represents a temporary adverse impact of medium magnitude on the structure and function of the district value site. This equates to a **moderate adverse effect** in the short term, which is **significant**. Embedded habitat mitigation will reduce this to a **minor adverse effect** when vegetation reaches maturity within 5-10 years, which is **not significant**. This embedded mitigation includes large areas of neutral grassland (with calcareous grassland in assessment Phase 2b) which will be managed for

50 years in accordance with the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**), replacing a small section of largely scrubbed over grassland verges, which will be partly retained if detailed design permits.

Assessment Phase 2b

8.9.15 No additional construction effects are anticipated in assessment Phase 2b as works within this area will be completed in prior assessment phases.

Habitats

8.9.16 Mitigation has been proposed with respect to construction effects on habitats included within the CoCP, **Appendix 4.2** of the ES **[TR020001/APP/5.02]**. Areas of embedded habitat creation within the provision of open space and landscape restoration areas bring the effects of loss of the majority of habitats to levels which are **not significant**. As such the effects would be as reported in **Table 8.17** for habitats other than those detailed below.

Ancient Woodland

8.9.17 There is one ancient woodland site directly affected by the construction of the Proposed Development, Winch Hill Wood, which is located within the Main Application Site. A second small area of potential Ancient Woodland may remain within Dairyborn Scarp DWS and require minor trimming back where it overhangs the Proposed Development. The small area of potential Ancient Woodland within Dairyborn Scarp DWS is not included on the Ancient Woodland Inventory, and is not deemed of sufficient value to meet the criteria to include it as part of the reasons for designating the site as a DWS. Both areas of ancient woodland fall within Winch Hill Wood CWS/LWS and Dairyborn Scarp DWS respectively, as such the impacts upon the ancient woodland as a result of each assessment phase of the construction works for the Proposed Development are reported within the designated nature conservation sites **Section 8.9.6** to **8.9.12**.

Broadleaved Semi-natural Woodland

Assessment Phase 1

8.9.18 No significant construction effects are anticipated in assessment Phase 1, (refer to the summary of the assessment of effects provided on **Table 8.17** in **Section 8.14**).

Assessment Phase 2a

8.9.19 Loss of approximately 1.53ha of broadleaved semi-natural woodland, including an area of priority habitat, of which 0.2ha lies outside of designated nature conservation sites, with the remaining mainly comprising the loss of 1.3ha within the remainder of Wigmore Park CWS, including woodland 7 (to works including car parks P8 and P11), and an area within Dairyborn Scarp DWS (0.09ha). Although some of the habitat losses have been considered in regards to impacts to the wildlife site above, the full losses for this habitat type are considered here to allow a full assessment of impact on this habitat type.

8.9.20 This temporary adverse impact, of medium magnitude, on the structure and function of the district value habitat, equates to a **moderate adverse effect** level that is **significant**. Embedded mitigation will reduce this to a **minor adverse effect** over time (10-30 years) following establishment of replacement habitat, which is **not significant**.

Assessment Phase 2b

8.9.21 No significant construction effects are anticipated in assessment Phase 2b (refer to the summary of the assessment of effects provided on **Table 8.17** in **Section 8.14**).

Species

Orchids

Assessment Phase 1

8.9.22 The assessment Phase 1 works for the Proposed Development will result in the loss of most of Wigmore Park CWS including the associated populations of common spotted orchid, pyramidal orchid, bee orchid and common twayblade. The existing orchid populations within the set-aside areas of the arable fields that will be used to create the provision of open space will be retained and protected during the construction of the Proposed Development, and long term management will be implemented to encourage long term viability of the orchid population in this area, as detailed within the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**). In addition, the embedded mitigation includes creation of neutral and calcareous grassland, and also bare chalk slopes, which are highly suitable for pyramidal and bee orchids. Despite these measures the partial loss of the orchid assemblage to the assessment Phase 1 works for the Proposed Development represents a temporary adverse impact, of medium magnitude, on this district value receptor. This equates to an initial **moderate adverse effect**, which is **significant**; however, with embedded mitigation discussed above to manage the orchids within the provision of open space, this decreases to a **minor adverse effect** when vegetation reaches maturity within 5-10 years, which is **not significant**.

Assessment Phase 2a

8.9.23 The construction of assessment Phase 2a of the Proposed Development will result in the loss of the remaining area of Wigmore Park CWS, including the remaining populations of orchids at this site. As discussed above, areas of existing orchid populations within the replacement Wigmore Park will be retained and management measures put in place to support long term viability of these populations. Further areas of grassland creation on calcareous soils will be established to the east of the replacement park, which will be managed to encourage a diverse flora including orchids. Despite these measures the loss of the orchid assemblage to the assessment Phase 2a construction works represents a temporary adverse impact, of medium magnitude, on this district value receptor. This equates to a **moderate adverse effect**, which is **significant**; however with embedded mitigation discussed above to manage the

orchids within the provision of open space, this decreases to a **minor effect** when vegetation reaches maturity within 5-10 years, which is **not significant**.

Assessment Phase 2b

8.9.24 The construction works for assessment Phase 2a of the Proposed Development will not result in any further impacts upon the orchid population.

Badger

Assessment Phase 1

8.9.25 The assessment Phase 1 works for the Proposed Development will result in the loss of at least four known outlier setts (two active, two disused) for works including car park creations e.g. P6 and P7, as well as grassland, scrub, hedgerow and woodland habitats that offer a foraging resource and form part of the territories for at least two badger groups, but predominantly the yellow clan occupying Wigmore Valley Park (confidential Appendix G of the Baseline Ecology Report, **Appendix 8.1** of this ES **[TR020001/APP/5.02]**. Four main badger setts (one now disused) and their associated outlier/annexe/subsidiary setts and partial territories are located within the provision of open space and habitat creation areas, and will be retained based on current design. The assessment Phase 1 works for the Proposed Development includes habitat creation within the area of provision of open space. This will reduce the impact of the loss of habitats upon the local badger social group; however, an impact remains given the time required for replacement habitats to establish to a level at which they provide an equivalent foraging resource. In addition, landscape and habitat creation works will affect/disturb four main setts (one now disused) and their associated outlier/annexe/subsidiary setts and partial territories, but it is assumed they can be retained. With embedded mitigation for retention and replacement of habitats, the loss of outlier setts and associated habitats to the assessment Phase 1 works for the Proposed Development represents a temporary adverse impact, of medium magnitude, on this local value receptor in the short term. This equates to a **minor adverse effect**, which is **not significant**. This will reduce to a **negligible effect**, which is **not significant** in the long term once habitats have matured (5-15 years). Despite not being a significant effect, the loss or disturbance of any sett requires additional mitigation which is detailed in **Section 8.10** and would be conducted under a Natural England development licence.

Assessment Phase 2a

8.9.26 The construction of assessment Phase 2a of the Proposed Development was previously anticipated to result in the potential loss or disturbance of one main badger sett to earthworks and creation of the fuel storage facility and water treatment plant, unless there would have been sufficient space to retain it depending upon detailed design. However updated surveys conducted in 2022 found this main sett to be disused. Disturbance will occur to one other main badger sett. There will also be the loss of three subsidiaries (one of which is disused) and loss and/or disturbance of outlier badger setts. The main sett (now disused) and two of the subsidiary setts are associated with the red clan, with

the further subsidiary and remaining outliers being associated with the clan within Wigmore Valley Park, assumed to be yellow clan.

8.9.27 In addition to the main earthworks of the Proposed Development, a fuel pipeline would be installed to the south east of Winch Hill. Depending on detailed design, this could cause temporary disturbance to a main sett (green clan) if the working area falls within 30m of the sett, and disturbance and/or loss of associated outliers within the working corridor of the new fuel pipeline as it passes through the woodland at Winch Hill House, along with creation of the landscape restoration and habitat creation areas. Construction of assessment Phase 2a of the Proposed Development will also result in the loss of grassland, scrub, hedgerow and woodland habitats that offer a foraging resource and form part of the territories of at least two different badger social groups.

8.9.28 Unlike the affected area for assessment Phase 1 which primarily comprises the creation of the open space and habitat creations areas in close proximity to main setts, assessment Phase 2a will incur loss of habitats in close proximity to retained main setts due to works, which will require fencing to prevent harm to badger during construction. With this species being highly mobile and changeable in areas used, the loss of setts, including potentially a disused main sett, and associated habitats, plus disturbance during construction to multiple setts, assessment Phase 2a of the Proposed Development represents a temporary adverse impact, of medium magnitude, on this local value receptor for loss of habitats and disturbance. This equates to a **minor adverse effect**, which is not **significant** in the short term**,** and **negligible effect** which is **not significant** in the long term once the habitats have matured (5-15 years). Detailed design will seek to retain and limit disturbance to the now disused main sett if possible as there remains a residual risk that pre-construction surveys find it to have become active again, but there is anticipated to be no impact at this stage.

Assessment Phase 2b

8.9.29 The construction of assessment Phase 2b of the Proposed Development includes further earthworks and establishment of a long-stay car park, plus landscape restoration. These have the potential to result in further disturbance to retained badger setts located within the boundary between the provision of open space and the assessment Phase 2b construction area, and within and around the woodland near Winch Hill. Further areas of habitat will be lost, however by this time, the habitat creation in earlier assessment phases, and provision of open space will have matured. Following the implementation of the measures described within the CoCP (**Appendix 4.2** of this ES **[TR020001/APP/5.02]**), any disturbance impacts upon the local badger social group will represent a temporary adverse impact, of low magnitude, on this local value receptor. This equates to a **negligible effect**, which is **not significant**.

Bats

Assessment Phase 1

8.9.30 The assessment Phase 1 works for the Proposed Development will result in the loss of grassland, scrub, waterbodies and woodland habitats at Wigmore Park

that are utilised by foraging bats, along with a small number of trees around Winch Hill Wood (for arboricultural requirements only - requiring removal for health of the woodland/trees and not necessitated by the Proposed Development), and further trees within and around the area of Winch Hill House and Cottages.

8.9.31 The removal or disturbance of foraging and commuting habitat features that are utilised by bats during the maternity season, hibernation or while migrating between roosts is considered to have the potential to result in adverse effects on the bat populations during construction. The implementation of habitat creation measures within the Proposed Development, will reduce the impact of the loss and fragmentation of habitats used by the local bat assemblage. However, it is recognised that time is required for replacement habitats to establish to a level at which they provide an equivalent foraging resource to that lost. The loss of foraging habitats to the assessment Phase 1 works for the Proposed Development, therefore, represents a temporary adverse impact of medium magnitude on this district value bat assemblage which would result in a **moderate adverse effect**, which is **significant**, decreasing to a **minor adverse effect** when vegetation reaches maturity within 10-12 years, which is **not significant** upon the local bat assemblage.

8.9.32 Construction disturbance and lighting could also affect the bat assemblage using the site. Following the implementation of embedded measures to reduce noise and light pollution, as described in the CoCP (**Appendix 4.2** of this ES **[TR020001/APP/5.02]**), a temporary adverse impact, of low magnitude, would occur on the local bat assemblage resulting in a **minor** adverse effect, which is **not significant**.

8.9.33 Single common pipistrelle summer day roosts were identified within a cottage at Winch Hill, a tree (T126) (**Figure 8.3** of this ES **[TR020001/APP/5.03]**) within nearby woodland, and the Pillbox to the north of Wigmore Park. Both structures and the tree will be surrounded by or adjacent to the land required for the assessment Phase 1 works for the provision of open space. Construction works associated with the assessment Phase 1 works for the Proposed Development have the potential to introduce disturbance, through construction related noise, lighting and vibration, to roosts within retained buildings adjacent to the Proposed Development. This represents a temporary adverse impact, of low magnitude upon this local value bat roost which would equate to a **negligible effect,** which is **not significant**.

8.9.34 Despite not being a significant effect, the loss or disturbance of any roost requires additional mitigation which is detailed in **Section 8.10** and would be conducted under a Natural England protected species mitigation licence.

Assessment Phase 2a

8.9.35 The construction of assessment Phase 2a of the Proposed Development will result in the loss of grassland, hedgerow, scrub, waterbodies and woodland habitats that are utilised by foraging and commuting bats. It will also result in the loss of one tree (T104) (**Figure 8.3** of this ES **[TR020001/APP/5.03]**) and disturbance of two trees (T120 and T124), the retained building roost in the Pillbox, and one further tree roost (T126) within woodland at Winch Hill, that

have been identified as supporting single or small numbers of common pipistrelle summer day roosts.

8.9.36 The construction of assessment Phase 2a of the Proposed Development will also result in a small amount of severance of some of the most utilised bat commuting routes that have been identified along the boundary of Wigmore Park and connecting Wigmore Park to the Winch Hill Wood ancient woodland. The removal or disturbance of habitat features that are utilised by bats during breeding, hibernation or migrating between roosts is considered to have the potential to result in adverse impacts on the bat populations during construction. The implementation of embedded habitat creation measures within the Proposed Development, will reduce the impact of the loss of habitats used by the local bat assemblage. However, in addition to the loss of commuting routes, it is also recognised that time is required for replacement habitats to establish to a level at which they provide an equivalent foraging resource to that lost, although by assessment Phase 2a, the habitat creation and landscape mitigation areas for assessment Phase 1 will have begun to mature. The loss of foraging habitats and well used commuting routes to the construction of assessment Phase 2a of the Proposed Development represents a temporary adverse impact of medium magnitude on this district value receptor. This equates to a **moderate adverse effect**, which is **significant,** decreasing to a **minor adverse effect** when assessment Phase 2a vegetation also reaches maturity within 10-12 years, which is **not significant**.

8.9.37 Works associated with construction of assessment Phase 2a of the Proposed Development will result in the loss of one common pipistrelle tree roost (T104) within the woodland in the remaining southern area of Wigmore Park CWS, and also have the potential to introduce disturbance, through construction related noise, lighting and vibration, to roosts within retained trees and buildings adjacent to the Proposed Development, including disturbance of two common pipistrelle tree roosts (T120 and T124) within the woodland belt to the west of Winch Hill Wood, the retained building roost in the Pillbox, and one further tree roost (T126) within woodland at Winch Hill. Following the implementation of embedded measures to reduce noise and light pollution, as described in the CoCP (**Appendix 4.2** of this ES **[TR020001/APP/5.02]**), this represents an adverse impact, of low magnitude, upon these local value bat roosts which would equate to a **minor adverse effect**, that is **not significant**. This will be a temporary effect for disturbance and a permanent impact for the loss of a roost.

Assessment Phase 2b

8.9.38 The construction of assessment Phase 2b of the Proposed Development will result in the loss of grassland, hedgerow, scrub, and woodland habitats that are utilised by foraging and commuting bats, to a smaller extent than previous stages, and within proximity to the existing and new areas of the airport, comprising mostly habitats already affected such as the woodland belt to the west of Winch Hill Wood.

8.9.39 The implementation of embedded habitat creation measures within the Proposed Development, will reduce the impact of the loss of habitats used by the local bat assemblage. However, in addition to the loss of commuting routes,

it is also recognised that time is required for replacement habitats to establish to a level at which they provide an equivalent foraging resource to that lost, although by assessment Phase 2b, the habitat creation and landscape mitigation areas for assessment Phase 1 and 2a will also have begun to have mature. The loss of foraging habitats and well used commuting routes to the construction of assessment Phase 2b of the Proposed Development represents a temporary adverse impact, of low magnitude, on this district value receptor. This equates to a **minor adverse effect**, which is **not significant,** decreasing to a **negligible effect** when assessment Phase 2b vegetation also reaches maturity within 10-12 years, which is **not significant**.

8.9.40 The construction of assessment Phase 2b of the Proposed Development will result in the loss of two small common pipistrelle summer day roosts in trees (T120 and T124) within the woodland belt to the west of Winch Hill Wood, and further disturbance of a similar tree roost (T126) near to Winch Hill. Implementation of embedded measures will reduce noise and light pollution, as described in the CoCP (**Appendix 4.2** of this ES **[TR020001/APP/5.02]**). Common pipistrelle are a common and widespread species therefore the loss of two low status roosts associated with this species and disturbance of others, represents an adverse impact, of low magnitude, on this local level receptor, which would result in a **minor adverse effect**, which is **not significant**. This will be temporary for disturbance and a permanent impact for the loss of a roost.

Amphibians

Assessment Phase 1

8.9.41 The assessment Phase 1 works for the Proposed Development will result in the loss of one pond (Pond 12) (refer to Appendix X1 of the Ecology Baseline Report, **Appendix 8.1** of this ES **[TR020001/APP/5.02]**) and associated terrestrial habitats of grassland, scrub, hedgerow and woodland that are likely to be used by amphibians such as smooth newt, common frog and common toad. In addition, the construction works have the potential to kill or injure amphibians during clearance of their terrestrial habitat. The embedded mitigation measures, including staged vegetation clearance, and appropriate timing of works within proximity to ponds, will reduce the risk of killing or injuring amphibians during the assessment Phase 1 works; however, this risk remains, especially during the removal of the pond. Therefore, the risk of killing or injuring amphibians during the assessment Phase 1 works for the Proposed Development represents an adverse impact on the local population of this local value receptor. With the embedded mitigation, the likelihood of impacts to amphibians due to this medium magnitude effect, equates to a **minor adverse effect,** which is **not significant.**

8.9.42 The embedded terrestrial habitat creation measures within the Proposed Development will reduce the effect of the loss of habitats. However, it is recognised that time is required for the replacement habitats to establish to a level at which they provide an equivalent resource to that loss. The loss of amphibian habitats, including Pond 12 to the assessment Phase 1 works for the Proposed Development represents a temporary adverse impact, of medium

magnitude, on this local value receptor. This equates to a **minor adverse effect**, which is **not significant**.

Assessment Phase 2a

8.9.43 The construction of assessment Phase 2a of the Proposed Development will result in the loss of four waterbodies (Ponds 8, 13, 14 and 15, although no amphibians were recorded at pond 15 and these ponds mostly comprise soakaways of limited biodiversity value) and associated terrestrial habitats of grassland, scrub, hedgerow and woodland that are likely to be used by amphibians such as smooth newt, common frog and common toad. In addition, assessment Phase 2a construction works have the potential to kill or injure amphibians during clearance of their habitat. The good practice mitigation measures, including staged vegetation clearance and the appropriate timing of these works, will reduce the risk of amphibians being killed or injured during the assessment Phase 2a construction works, however this risk remains, especially during removal of ponds. With embedded mitigation the likelihood of impacts to amphibians is of medium magnitude on this local value receptor equating to a **minor adverse effect,** which is **not significant**.

8.9.44 The embedded habitat creation measures within the Proposed Development will reduce the effect of the loss of habitats. However, it is recognised that time is required for the replacement habitats to establish to a level at which they provide an equivalent resource to that loss, although by assessment Phase 2a, the habitats within assessment Phase 1 will have matured/established. The loss of amphibian habitats to construction of assessment Phase 2a of the Proposed Development represents a temporary adverse effect, of medium magnitude on this local value receptor. This equates to a **minor adverse effect**, which is **not significant**.

Assessment Phase 2b

8.9.45 The construction of assessment Phase 2b of the Proposed Development will result in the loss of Ponds 5 and 6 (although these ponds comprise fire training pools of limited biodiversity value), and smaller areas of associated grassland, scrub, hedgerow and woodland habitats that are likely to be used by amphibians such as smooth newt, common frog and common toad will be affected, including in the north in proximity to retained ponds. Assessment Phase 2b construction works have the potential to kill or injure amphibians during clearance of their habitat, although in assessment Phase 2b, habitat loss that has not already been affected during assessment Phase 2a is limited. The good practice mitigation measures, including staged vegetation clearance and the appropriate timing of these works will reduce the risk of amphibians being killed or injured during assessment Phase 2b construction works, however this risk remains. This represents an adverse impact of low magnitude, on this local value receptor. The embedded mitigation reduces the likelihood of impacts to amphibians to a **negligible effect,** which is **not significant**.

8.9.46 The embedded habitat creation measures within the Proposed Development will reduce the effect of the loss of habitats although in assessment Phase 2b, habitat loss that has not already been affected during assessment Phase 2a is limited. However, it is recognised that time is required for the replacement

habitats to establish to a level at which they provide an equivalent resource to that loss, although by assessment Phase 2b, the habitats created within assessment Phases 1 and 2a will have matured. The loss of amphibian habitats to construction of assessment Phase 2b of the Proposed Development represents a temporary adverse effect of low magnitude on this local value receptor. This equates to a **negligible effect**, which is **not significant**.

Terrestrial invertebrates

Assessment Phase 1

8.9.47 The assessment Phase 1 works for the Proposed Development will result in the loss of a habitat mosaic which includes calcareous and neutral grasslands, arable margins, bare/disturbed ground, scrub, woodland and waterbodies. This mosaic of habitats supports a notable assemblage of invertebrates including the species of principal importance; a picture-winged fly, the set-aside downy-back beetle and the dingy skipper butterfly. The habitat creation measures within the Proposed Development, including meadow grasslands, edges habitats, early successional habitats, hedgerows, and woodland, are included to reduce the impact of the loss of invertebrate habitats. However, it is recognised that time is required for the replacement habitat to establish, following appropriate management regimes, to provide an equivalent resource to that lost. The loss of invertebrate habitats to the assessment Phase 1 works for the Proposed Development represents a temporary medium adverse effect at the county level, which equates to an initial **moderate adverse effect**, which is **significant**, decreasing to a **minor adverse** effect when habitats have established, within five years, which is **not significant**.

8.9.48 Work during construction of this assessment phase involving large earthworks and heavy machinery would inevitably result in the death of a range of ground dwelling invertebrates, particularly slower moving, flightless arthropods, which cannot avoid the area. This is unlikely to permanently affect the population dynamics of any community in the wider landscape. Direct mortality caused by the construction of assessment Phase 1 would constitute an impact of low magnitude at the county level, that equates to a **minor adverse** effect, which is **not significant**.

Assessment Phase 2a

8.9.49 The construction of assessment Phase 2a of the Proposed Development will result in the further loss of a habitat mosaic which includes calcareous and neutral grasslands, bare/disturbed ground, scrub, hedgerows, woodland and waterbodies, this mosaic of habitats supports a notable assemblage of invertebrates as listed in assessment Phase 1 effects above. The habitat creation measures within the Proposed Development, including meadow grasslands, edge habitats, early successional habitats, hedgerows, and woodland, will reduce the impact of the loss of invertebrate habitats. However, it is recognised that time is required for the replacement habitat to establish to a level at which they provide and equivalent resource to that lost, but that created for assessment Phase 1 would now have matured. The loss of invertebrate habitats to the assessment Phase 2a construction of the Proposed

Development represents an initial temporary adverse impact of medium magnitude on this county value receptor, which equates to a **moderate adverse effect**, which is **significant**, decreasing to a **minor adverse** effect when habitats have established, within five years, which is **not significant**.

8.9.50 Risk of harm during construction, as per assessment Phase 1 in **paragraph 8.9.48** above.

Assessment Phase 2b

8.9.51 The construction of assessment Phase 2b of the Proposed Development will result in the loss of smaller areas of a habitat mosaic which includes grasslands, bare/disturbed ground, scrub, and woodland. This mosaic of habitats may still support part of the notable assemblage of invertebrates as listed in assessment Phase 1 effects above. The remaining habitat creation measures within the Proposed Development, including additional areas of calcareous grasslands, will reduce the impact of the loss of invertebrate habitats. However, it is recognised that time is required for the replacement habitat to establish to a level at which they provide an equivalent resource to that lost, but that created for assessment Phase 1 and assessment Phase 2a would now have matured. The loss of invertebrate habitats to the construction of assessment Phase 2b of the Proposed Development represents a temporary adverse impact of low magnitude (due to a smaller scale of loss in this assessment phase) on this county value receptor. This represents an initial low adverse effect at the county level, which equates to a **minor adverse effect**, which is **not significant**, decreasing to a **negligible adverse** effect when habitats have established which is expected to be within five years, which is **not significant**.

8.9.52 Risk of harm during construction, as per assessment Phase 1 in **paragraph 8.9.48** above.

Operation

Designated nature conservation sites

Wigmore Park CWS

Assessment Phase 1

8.9.53 The operation of assessment Phase 1 of the Proposed Development and creation of temporary surface car parks P5-7 (as described in **Chapter 4** of this ES **[TR020001/APP/5.01]** and shown in **Figure 4.1 to 4.3** of this ES **[TR020001/APP/5.03]**) within close proximity to the remaining area of Wigmore Park CWS, has the potential to locally impact on the quantity and direction of surface runoff, and increase lighting pressures. The embedded drainage strategy (**Appendix 20.4** of this ES **[TR020001/APP/5.02]**) and lighting design, including directional lighting to limit light spill onto adjacent habitats, will reduce these effects to a temporary **Minor adverse effect** that is **not significant**.

Assessment Phase 2a

8.9.54 The operation of assessment phase 2a of the Proposed Development will not result in additional effects upon Wigmore Park CWS as it will no longer exist as a functional CWS due to only 6.6% of the original area remaining.

Assessment Phase 2b

8.9.55 The operation of assessment phase 2b of the Proposed Development will not result in additional effects upon Wigmore Park CWS as it will no longer exist.

Winch Hill Wood CWS/LWS Ancient Woodland

8.9.56 No significant operation effects relating to biodiversity are anticipated in addition to the air quality effects, therefore please refer to the summary of the assessment of effects provided on in **Section 8.14**. Details of Air Quality assessments associated with assessment Phase 1 are however noted below.

Assessment Phase 1

8.9.57 Winch Hill Wood CWS/LWS has been subject to an air quality assessment within **Chapter 7** of this ES **[TR020001/APP/5.01]**, as it falls within 2km of the Main Application Site. The assessment used the critical load of 10kgN/ha/yr as the exceedance threshold as this is the lowest part of the critical load range for woodland. However, Paragraph 5.26 of Natural England guidance (Ref 8.58) states that "*An exceedance alone is insufficient to determine the acceptability (or otherwise) of a project'*. Where an exceedance of the Critical Load is expected, it is also necessary to consider whether the forecast dose will be imperceptible. As per paragraph 4.25 of same guidance '…*1% of critical load/level are considered by Natural England's air quality specialists (and by industry, regulators and other statutory nature conservation bodies) to be suitably precautionary, as any emissions below this level are widely considered to be imperceptible…There can therefore be a high degree of confidence in its application to screen for risks of an effect"*. Moreover, Natural England guidance is also clear that even exceedance of the '1% of the critical level/load' threshold does not necessarily mean that a significant adverse effect will arise.

8.9.58 In terms of the impact of changes in air quality on the ancient woodland, the contribution of the Proposed Development to change just exceeds 1%[3] (Ref. 8.58) of the relevant air quality objective and Critical Loads, however the maximum nitrogen dose is 0.4 kgN/ha/yr at the edge of the woodland. This dose falls at just below the 0.4 kgN/ha/yr guideline[4] (Ref. 8.59) for a minimum dose associated with a reduction in 'species richness', reducing to below this value

[3] '*1% of critical load/ level are considered by Natural England's air quality specialists (and by industry, regulators and other statutory nature conservation bodies) to be suitably precautionary, as any emissions below this level are widely considered to be imperceptible…There can therefore be a high degree of confidence in its application to screen for risks of an effect'*

[4] Guidance from Highways England (Design Manual for Roads and Bridges LA 105 is based on published nitrogen dose-response relationships for a range of habitats, and advises that even if the nitrogen dose exceeds 1% of the critical load, a conclusion of no significant adverse effect can still be drawn if the maximum nitrogen dose is less than 0.4 kgN/ha/yr. This is on the basis that Highways England considers this to be the minimum dose that has been identified to be associated with a reduction in 'species richness' of one species, irrespective of background deposition rate.

immediately into the woodland. This represents a permanent adverse impact, of very low magnitude, on this county value receptor, which equates to a **minor adverse**, effect which is **not significant**.

8.9.59 With regard to NOx itself, the Air Pollution Information System (APIS) identifies that negative effects of NOx/NO_2 in atmosphere (as distinct from its role in nitrogen deposition) are most likely to arise in the presence of equivalent concentrations of sulphur dioxide (SO_2). Vehicle exhausts do not emit notable amounts of SO_2 as sulphur is not in the regulated fuels, and APIS indicates that background SO_2 concentrations at the Proposed Development and ARN are very low (a range of 0.8 to 2.7 μgm^{-3}) compared to critical levels for SO_2 of 10-20 μgm^{-3}. Since the SO_2 concentrations are so low, no synergistic effect with NOx is expected. This applies to **all receptors** assessed for air quality and **all assessment phases** of the Proposed Development and is therefore not repeated for each.

Assessment Phase 2a

8.9.60 The Air Quality assessment for assessment Phase 2a determined that the contribution of the Proposed Development to change exceeds 1% of the relevant air quality objective and Critical Loads. A transect through the woodland was assessed and the maximum nitrogen dose was found to be 0.98 to 1.00 kgN/ha/yr through to 110m within the woodland, which is greater than the 0.4 kgN/ha/yr guideline for a minimum dose associated with a reduction in 'species richness'. However, the CWS/LWS is already subject to high background nitrogen deposition due to existing sources (agriculture, the existing airport, the existing road network and other sources). The actual proportional change in nitrogen deposition due to the Proposed Development is 2.8% (a maximum of 1 kgN/ha/yr on top of a predicted Do Minimum of 35.8 kgN/ha/yr for assessment Phase 2a. Dose-response data (Ref. 8.60) indicate that for species-richness many habitats see a reducing effect from further nitrogen deposition when nitrogen is already in excess because more competitive, less desirable, species already have sufficient nitrogen to outcompete the more desirable species; therefore the vast majority of any botanical changes likely to be caused by nitrogen deposition on this site will have already occurred without the Proposed Development. As the habitats would have already received a high dose in the current load and developed accordingly, the increase in load caused by the Proposed Development is unlikely to cause any further significant adverse changes within the habitats. This represents a permanent adverse impact, of low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant** without further mitigation.

8.9.61 In addition, atmospheric ammonia for agricultural activity (livestock and fertiliser) is likely to have an considerable effect on nitrogen deposition (it is not unusual for at least a third of nitrogen deposited on a site to come from these sources) and therefore, there may be beneficial impacts to nitrogen deposition as a result of the Proposed Development due to the Habitat Creation Area and parts of the provision of open space removing land from agricultural production and fertilisation. This has not been considered in the air quality modelling and may therefore reduce the predicted change stated for this CWS/LWS which lies within these areas.

Assessment Phase 2b

8.9.62 The Air Quality assessment for assessment Phase 2b determined that the contribution of the Proposed Development to change exceeds 1% of the relevant air quality objective and Critical Loads. A transect through the woodland was assessed and the maximum nitrogen dose was 1.84 to 1.65 kgN/ha/yr, moving from the edge of the woodland to 110m within. All of these values are above the 0.4 kgN/ha/yr guideline for a minimum dose associated with a reduction in 'species richness'. However, the CWS/LWS is already subject to high background nitrogen deposition due to existing sources (agriculture, the existing airport, the existing road network and other sources). The actual proportional change in nitrogen deposition due to the Proposed Development is 5.1% (a maximum of 1.84 kgN/ha/yr on top of a predicted Do Minimum of 35.8 kgN/ha/yr for assessment Phase 2a) and is unlikely to cause any further significant adverse changes within the habitats (Ref. 8.60). This represents a permanent adverse impact, of low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant** without further mitigation.

Luton Parkway Verge DWS

Assessment Phase 1

8.9.63 There will be no operational effect on Luton Parkway Verges DWS other than for air quality effects stated below.

8.9.64 Luton Parkway Verge DWS has been subject to an air quality assessment within **Chapter 7** of this ES **[TR020001/APP/5.01]**, as it falls within the Main Application Site and 200m of the ARN. The assessment used the critical load of 15kgN/ha/yr as the exceedance threshold as this is the lowest relevant part of the critical load range for calcareous grassland. In terms of the impact of changes in air quality on the habitats, the contribution of the Proposed Development to change just exceeds 1%[3] (Ref. 8.58) of the relevant air quality objective and Critical Loads, however, the maximum nitrogen dose is 0.22 kgN/ha/yr. This dose falls below the 0.4 kgN/ha/yr guideline[4] (Ref. 8.59) for a minimum dose associated with a reduction in 'species richness'. This represents a permanent adverse impact, of very low magnitude, on this county value receptor, which equates to a **minor adverse**, effect which is **not significant**.

Assessment Phase 2a

8.9.65 Although part of the DWS will be lost during assessment Phase 2a, the remaining areas outside of the Order Limits and any remaining within the Order Limits may be subject to air quality effects. The Air Quality assessment for assessment Phase 2a determined that the contribution of the Proposed Development to change exceeds 1%[3] of the relevant air quality objective and Critical Loads. A transect through the DWS was assessed and the maximum nitrogen dose was found to be 0.76 kgN/ha/yr at the roadside, dropping below this and rising again to 0.73 kgN/ha/yr at 70m along the transect which falls adjacent to another roadside. Both are greater than the 0.4 kgN/ha/yr guideline[4]

for a minimum dose associated with a reduction in 'species richness'. However, the DWS is already subject to high background nitrogen deposition due to existing sources (agriculture, the existing airport, the existing road network and other sources). The actual proportional change in nitrogen deposition due to the Proposed Development is 1.9% (a maximum of 0.76 kgN/ha/yr on top of a predicted Do Minimum of 39.3 kgN/ha/yr at the same point on the transect) and is unlikely to cause any further significant adverse changes within the habitats (Ref. 8.60). This represents a permanent adverse impact, of low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant**.

8.9.66 Any remaining areas of Luton Parkway Verges DWS that fall within the Applicant's ownership will be subject to management measures to promote the diverse botany for which the site is designated, although is currently predominantly scrub habitat where the DWS falls within the Order Limits. This will include measures such as mowing and removal of arisings, and scrub management to prevent encroachment and shading. In order to reduce trampling pressures and littering upon the designating habitats of the DWS, post and rail fencing will be established to deter 'cut throughs' from the new car park, interpretation boards will be erected to explain the value of the DWS, and monitoring and management of litter removal will be enacted. These measures are detailed within the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**). The multi storey car park built immediately adjacent to the DWS could cause shading of remaining habitats of the site which could impair the quality of the habitats in the long term. The shading, together with trampling and recreational littering pressures will be a permanent adverse impact, of low magnitude, on the function of the county value site, which equates to a **minor adverse effect** that is **not significant**.

Assessment Phase 2b

8.9.67 There will be no additional operational effect on Luton Parkway Verges DWS other than air quality effects stated below.

8.9.68 The Air Quality assessment for assessment Phase 2b determined that the contribution of the Proposed Development to change exceeds 1% of the relevant air quality objective and Critical Loads. A transect through the DWS was assessed and the maximum nitrogen dose was 0.83, dropping to 0.75 and rising to 0.93 kgN/ha/yr, moving from the edge of the DWS across and to 70m at the opposite edge of the DWS. All of these values are above the 0.4 kgN/ha/yr guideline for a minimum dose associated with a reduction in 'species richness'. However, the DWS is already subject to high background nitrogen deposition due to existing sources (agriculture, the existing airport, the existing road network and other sources). The actual proportional change in nitrogen deposition due to the Proposed Development is 2.2% (a maximum of 0.93 kgN/ha/yr on top of a predicted Do Minimum of 41.6 kgN/ha/yr at the same point on the transect) and is unlikely to cause any further adverse changes within the habitats (Ref. 8.60). This represents a permanent adverse impact, of low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant** without further mitigation.

Dairyborn Scarp DWS

Assessment Phase 1

8.9.69 There will be no operational effect on Dairyborn Scarp DWS other than for air quality effects stated below.

8.9.70 Dairyborn Scarp DWS has been subject to an air quality assessment within **Chapter 7** of this ES **[TR020001/APP/5.01]**, as it falls within 2km of the Main Application Site and 200m of the ARN. The assessment used the critical load of 10kgN/ha/yr as the exceedance threshold as this is the lowest relevant part of the critical load range for habitats present. In terms of the impact of changes in air quality on the habitats, the contribution of the Proposed Development to change exceeds 1%[3] (Ref. 8.58) of the relevant air quality objective and Critical Loads in both transects undertaken for the total length of each (20m for one and 60m for the second due to being a narrow site). The maximum nitrogen dose is only 0.19 kgN/ha/yr maximum in the 20m transect due to the distance this transect lies from the edge of the ARN (92m), and was measured at the southern most point where the DWS falls within the Order Limits. This dose falls below the 0.4 kgN/ha/yr guideline[4] (Ref. 8.59) for a minimum dose associated with a reduction in 'species richness'. The maximum nitrogen dose along the 60m transect is 1.27 kgN/ha/yr at the roadside adjacent to a crossroad of the ARN, dropping to 0.9 kgN/ha/yr by 10m into the transect and to 0.61 kgN/ha/yr at 60m, which all are above 0.4 kgN/ha/yr. However, the DWS is already subject to high background nitrogen deposition due to existing sources (agriculture, the existing airport, the existing road network and other sources). The actual proportional change in nitrogen deposition due to the Proposed Development is 2.6% (a maximum of 1.27 kgN/ha/yr on top of a predicted Do Minimum of 48.4 kgN/ha/yr at the same point on the transect for assessment Phase 1 which is already nearly five times the critical load) and is unlikely to cause any further significant adverse changes within the habitats (Ref. 8.60). This represents a permanent adverse impact, of low magnitude on the area of the DWS for the 60m transect (very low for the 20m transect), on this county value receptor, which equates to a **minor adverse**, effect which is **not significant**.

Assessment Phase 2a

8.9.71 Although part of the DWS will be lost during assessment Phase 2a, the remaining areas outside of the Order Limits and areas remaining within the Order Limits may be subject to air quality effects. The Air Quality assessment for assessment Phase 2a determined that the contribution of the Proposed Development to change exceeds 1% of the relevant air quality objective and Critical Loads for both transects undertaken. The maximum nitrogen dose was found to be 1.09 kgN/ha/yr at the roadside, dropping to 1 kgN/ha/yr at 60m along the 60m transect, and 0.46 kgN/ha/yr to 0.48 kgN/ha/yr at 20m along the 20m transect. Both are greater than the 0.4 kgN/ha/yr guideline for a minimum dose associated with a reduction in 'species richness', although only just for the 20m transect. However, the DWS is already subject to high background nitrogen deposition due to existing sources (agriculture, the existing airport, the existing road network and other sources). The actual proportional change in

nitrogen deposition due to the Proposed Development is 2.28% (a maximum of 1.09 kgN/ha/yr on top of a predicted Do Minimum value of 47.9 kgN/ha/yr at the same point on the transect for assessment Phase 2a) and is unlikely to cause any further significant adverse changes within the habitats(Ref. 8.60). This represents a permanent adverse impact, of low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant**.

Assessment Phase 2b

8.9.72 The Air Quality assessment for assessment Phase 2b determined that the contribution of the Proposed Development to change exceeds 1% of the relevant air quality objective and Critical Loads for both transects undertaken. The maximum nitrogen dose was found to be 1.06 kgN/ha/yr at the roadside, changing to 1.27 kgN/ha/yr at 60m along the 60m transect, and 0.58 kgN/ha/yr to 0.61 kgN/ha/yr at 20m along the 20m transect. Both are greater than the 0.4 kgN/ha/yr guideline for a minimum dose associated with a reduction in 'species richness'. However, the DWS is already subject to high background nitrogen deposition due to existing sources (agriculture, the existing airport, the existing road network and other sources). The actual proportional change in nitrogen deposition due to the Proposed Development is 3.2% (a maximum of 1.27 kgN/ha/yr on top of a predicted Do Minimum of 39.7 kgN/ha/yr at the same point on the transect for assessment Phase 2b) and is unlikely to cause any further significant adverse changes within the habitats (Ref. 8.60). This represents a permanent adverse impact, of low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant**.

Burnt Wood LWS

8.9.73 No operation effects relating to biodiversity are anticipated in addition to the air quality effects stated below.

Assessment Phase 1

8.9.74 Burnt Wood LWS has been subject to an air quality assessment within **Chapter 7** of this ES **[TR020001/APP/5.01]**, as it falls within 2km of the Main Application Site. The assessment used the critical load of 10kgN/ha/yr as the exceedance threshold as this is the lowest part of the critical load range for woodland. In terms of the impact of changes in air quality on the ancient woodland, the contribution of the Proposed Development to change just exceeds 1%[3] (Ref. 8.58) of the relevant air quality objective and Critical Loads, however the maximum nitrogen dose is 0.2 kgN/ha/yr at the edge of the woodland. This dose falls below the 0.4 kgN/ha/yr guideline[4] (Ref. 8.59) for a minimum dose associated with a reduction in 'species richness', reducing to below this value immediately into the woodland. This represents a permanent adverse impact, of very low magnitude, on this county value receptor, which equates to a **minor adverse**, effect which is **not significant**.

Assessment Phase 2a

8.9.75 The Air Quality assessment for assessment Phase 2a determined that the contribution of the Proposed Development to change exceeds 1% of the relevant air quality objective and Critical Loads. A transect through the

woodland was assessed and the maximum nitrogen dose was found to be 0.54 to 0.41 kgN/ha/yr through to 200m within the woodland, which is just greater than the 0.4 kgN/ha/yr guideline for a minimum dose associated with a reduction in 'species richness'. However, the LWS is already subject to high background nitrogen deposition due to existing sources (agriculture, the existing airport, the existing road network and other sources). The actual proportional change in nitrogen deposition due to the Proposed Development is 1.54% (a maximum of 0.54 kgN/ha/yr on top of a predicted Do Minimum of 35.3 kgN/ha/yr for assessment Phase 2a) and is unlikely to cause any further significant adverse changes within the habitats (Ref. 8.60). This represents a permanent adverse impact, of low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant** without further mitigation.

8.9.76 In addition, atmospheric ammonia for agricultural activity (livestock and fertiliser) is likely to have an considerable effect on nitrogen deposition (it is not unusual for at least a third of nitrogen deposited on a site to come from these sources) and therefore, there may be beneficial impacts to nitrogen deposition as a result of the Proposed Development due to the Habitat Creation Area and parts of the provision of open space removing land from agricultural production and fertilisation. This has not been considered in the air quality modelling and may therefore reduce the predicted change stated for this LWS which lies approximately 300m from these areas.

Assessment Phase 2b

8.9.77 The Air Quality assessment for assessment Phase 2b determined that the contribution of the Proposed Development to change exceeds 1% of the relevant air quality objective and Critical Loads. A transect through the woodland was assessed and the maximum nitrogen dose was 0.9 kgN/ha/yr to 0.66 kgN/ha/yr, moving from the edge of the woodland to 200m within. All of these values are above the 0.4 kgN/ha/yr guideline for a minimum dose associated with a reduction in 'species richness'. However, the LWS is already subject to high background nitrogen deposition due to existing sources (agriculture, the existing airport, the existing road network and other sources). The actual proportional change in nitrogen deposition due to the Proposed Development is 2.55% (a maximum of 0.9 kgN/ha/yr on top of a predicted Do Minimum of 35.3 kgN/ha/yr for assessment Phase 2a) and is unlikely to cause any further significant adverse changes within the habitats (Ref. 8.60). This represents a permanent adverse impact, of low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant** without further mitigation.

Kidney and Bull Woods CWS/Ancient Woodland

Assessment Phase 1

8.9.78 Kidney and Bull Woods CWS/Ancient Woodland has been subject to an air quality assessment within **Chapter 7** Air Quality **[TR020001/APP/5.01]**, as it falls within 2km of the Main Application Site and 200m of the ARN. The assessment used the critical load of 10 kgN/ha/yr as the threshold as this is the lowest part of the critical load range for woodland. In terms of the impact of

changes in air quality on the CWS and ancient woodland, the contribution of the Proposed Development to change exceeds 1% (Ref. 8.58) of the relevant air quality objective and Critical Loads in both transects undertaken (for all 200m of one and only 60m of the second). However, the maximum nitrogen dose is 1.19 kgN/ha/yr at the roadside, falling to 0.8 kgN/ha/yr 10m in and below 0.4 kgN/ha/yr by 40m in one transect and 0.74 kgN/ha/yr at the roadside, falling to below 0.4 kgN/ha/yr by 20m into the second transect. This means that the effect falls below the 0.4 kgN/ha/yr guideline (Ref. 8.59) for a minimum dose associated with a reduction in 'species richness' by a maximum of 40m into the large CWS. One transect also shows a positive change in values between 100m and 200m up to 0.15 kgN/ha/yr. However, the CWS is already subject to high background nitrogen deposition due to existing sources (agriculture, the existing airport, the existing road network and other sources). The actual proportional change in nitrogen deposition due to the Proposed Development is 2.17% but falls to 1.68% by 10m into the transect (a maximum of 1.19 kgN/ha/yr on top of a predicted Do Minimum of 54.8 kgN/ha/yr at the same point on the transect for assessment Phase 1) and is unlikely to cause any further adverse changes within the habitats (Ref. 8.60). This change in air quality represents a permanent adverse impact, of low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant.**

Assessment Phase 2a

8.9.79 The Air Quality assessment for assessment Phase 2a determined that the contribution of the Proposed Development to change exceeds 1% of the relevant air quality objective and Critical Loads for 200m through the first transect into the CWS and 100m into the second transect. However the maximum nitrogen dose is 1.36 kgN/ha/yr at the roadside, falling to 1 kgN/ha/yr at 10m and to below 0.4 kgN/ha/yr by 60m along one transect, and 1.87 kgN/ha/yr at the roadside falling to below 0.4 kgN/ha/yr by 80m in for the second transect. This means that the effect falls below the 0.4 kgN/ha/yr, which is the guideline for a minimum dose associated with a reduction in 'species richness' by a maximum of 80m into the large CWS. One transect also shows a positive change in values between 130m and 170m up to 0.05 kgN/ha/yr. However, the CWS is already subject to high background nitrogen deposition due to existing sources (agriculture, the existing airport, the existing road network and other sources). The actual proportional change in nitrogen deposition due to the Proposed Development is 3.52%, falling to 2.5% by 10m into the transect (a maximum of 1.87 kgN/ha/yr on top of a predicted Do Minimum of 53.3 kgN/ha/yr for assessment Phase 2a) and is unlikely to cause any further significant adverse changes within the habitats (Ref. 8.60). This change in air quality represents a permanent adverse impact, of low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant**.

Assessment Phase 2b

8.9.80 The Air Quality assessment for assessment Phase 2b determined that the contribution of the Proposed Development to change exceeds 1% of the relevant air quality objective and Critical Loads for 200m and 100m along each

transect (composite site). The maximum nitrogen dose is 2.46 and 1.58 kgN/ha/yr at the edge of the roadside for each transect, which is above the 0.4 kgN/ha/yr guideline for a minimum dose associated with a reduction in 'species richness'. However, this falls to 1.56 and 1.14 kgN/ha/yr by 10m in, and to 0.4 kgN/ha/yr before it reaches 100 and 60m into the woodland respectively. One transect also shows a positive change in values between 120m and 200m up to 0.07 kgN/ha/yr. However, the CWS is already subject to high background nitrogen deposition due to existing sources (agriculture, the existing airport, the existing road network and other sources). The actual proportional change in nitrogen deposition due to the Proposed Development is 4.7%, falling to 3.4% by 10m into the transect (a maximum of 2.46 kgN/ha/yr on top of a predicted Do Minimum of 52.2 kgN/ha/yr at the same point in the transect for assessment Phase 2b) and is unlikely to cause any further significant adverse changes within the habitats (Ref. 8.60). This change in air quality represents a permanent adverse impact, of low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant**.

Luton Hoo Park CWS and River Lea CWS

Assessment Phase 1

8.9.81 Luton Hoo Park CWS and River Lea CWS have been subject to an air quality assessment within **Chapter 7** Air Quality **[TR020001/APP/5.01]**, as they fall within 2km of the Main Application Site and 200m of the ARN. These CWSs lie adjacent to each other when adjoining the A1081. The assessment used the critical load of 10 kgN/ha/yr as the threshold as this is the lowest part of the critical load range for woodland which is present here. Two transects were assessed, one which lies where the two sites are located starting at the A1081 (100m long), and a second which lies only within Luton Hoo Park CWS closer to the Main Application Site (200m long). In terms of the impact of changes in air quality on the CWSs, the contribution of the Proposed Development to change exceeds 1% (Ref. 8.58) of the relevant air quality objective and Critical Loads in both transects undertaken (for all 100m of one and all 200m of the second). However, the maximum nitrogen dose is 0.56 kgN/ha/yr at the roadside, falling to 0.41 kgN/ha/yr 10m in and below 0.4 kgN/ha/yr by 20m in one transect and 0.99 kgN/ha/yr at the roadside, falling to below 0.4 kgN/ha/yr by 20m into the second transect where the CWSs are adjacent to each other. This means that the effect falls below the 0.4 kgN/ha/yr guideline (Ref. 8.59) for a minimum dose associated with a reduction in 'species richness' by a maximum of 30m into the CWSs. The two CWS are already subject to high background nitrogen deposition due to existing sources (agriculture, the existing airport, the existing road network and other sources). The actual proportional change in nitrogen deposition due to the Proposed Development is 1.9%, but falls to 1.6% by 10m into the transect (a maximum of 0.99 kgN/ha/yr on top of a predicted Do Minimum of 50.6 kgN/ha/yr at the same point on the transect for assessment Phase 1) and is unlikely to cause any further significant adverse changes within the habitats (Ref. 8.60). This change in air quality represents a permanent adverse impact, of low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant.**

Assessment Phase 2a

8.9.82 The Air Quality assessment for assessment Phase 2a determined that the contribution of the Proposed Development to change exceeds 1% of the relevant air quality objective and Critical Loads for the whole of both transects into the CWSs. However the maximum nitrogen dose is 1.34 kgN/ha/yr at the roadside, falling to 0.85 kgN/ha/yr at 10m and to below 0.4 kgN/ha/yr by 80m along one transect, and 1.16 kgN/ha/yr at the roadside falling to 0.8 kgN/ha/yr by 10m and to below 0.4 kgN/ha/yr by 60m in for the second transect where both CWS are located. This means that the effect falls below the 0.4 kgN/ha/yr, which is the guideline for a minimum dose associated with a reduction in 'species richness' by a maximum of 80m into the large CWS. The two CWS are already subject to high background nitrogen deposition due to existing sources (agriculture, the existing airport, the existing road network and other sources). The actual proportional change in nitrogen deposition due to the Proposed Development is 2.7% change, falling to 1.7% by 20m into the transect (a maximum of 1.34 kgN/ha/yr on top of a predicted Do Minimum of 49.5 kgN/ha/yr at the same point in the transect for assessment Phase 2a) and is unlikely to cause any further significant adverse changes within the habitats (Ref. 8.60). This change in air quality represents a permanent adverse impact, of low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant**.

Assessment Phase 2b

8.9.83 The Air Quality assessment for assessment Phase 2b determined that the contribution of the Proposed Development to change exceeds 1% of the relevant air quality objective and Critical Loads for the whole of both transects into the CWSs. The maximum nitrogen dose is 1.71 and 1.67 kgN/ha/yr at the edge of the roadside for each transect, which is above the 0.4 kgN/ha/yr guideline for a minimum dose associated with a reduction in 'species richness'. However, this falls to 1.14 and 1.13 kgN/ha/yr by 10m in, and to 0.4 kgN/ha/yr before it reaches 140 and 90m into the woodland respectively. The two CWS are already subject to high background nitrogen deposition due to existing sources (agriculture, the existing airport, the existing road network and other sources). The actual proportional change in nitrogen deposition due to the Proposed Development is 3.5%, falling to 2.4% by 20m into the transect (a maximum of 1.71 kgN/ha/yr on top of a predicted Do Minimum of 48.2 kgN/ha/yr at the same point in the transect for assessment Phase 2b) and is unlikely to cause any further significant adverse changes within the habitats (Ref. 8.60). This change in air quality represents a permanent adverse impact, of low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant**.

Habitats

Ancient Woodland

8.9.84 There are a number of ancient woodland sites affected by the operation of the Proposed Development. These include Winch Hill Wood, which is located within the Main Application Site, and Kidney and Bull Woods which is located within

200m of the ARN. Ancient woodland forms the basis for the designation of Winch Hill Wood CWS/LWS and Kidney and Bull Woods CWS, and as such the impacts upon these ancient woodlands as a result of each assessment phase of the operation works for the Proposed Development are reported within the designated nature conservation sites within this **Section 8.9** and **Section 8.14**.

8.9.85 Chalk Wood, Slaughters Wood, and parts of Kingshoe Wood are all also areas of ancient woodland assessed for air quality impacts but, as although they are predicted to be subjected to a greater than 1% of the relevant air quality objective and Critical Loads by the Proposed Development and by more than 0.4 kgN/ha/yr, they will not be significantly affected, and are therefore included within **Table 8.17**.

8.9.86 Furzen Wood, Stubbocks Wood, Watkin's Wood and Lord's Wood, Sewetts Wood, Withstocks Wood, Slaughters Wood, George Wood, Hardingdell Woods and Fernell's Wood, Horsleys Wood, and Birch Wood, are further areas of ancient woodland assessed for air quality impacts but, as although they are predicted to be subjected to a greater than 1% of the relevant air quality objective and Critical Loads by the Proposed development, the change will be less than 0.4 kgN/ha/yr, and they will not be significantly affected and are therefore included within **Table 8.17**.

8.9.87 No other Ancient Woodland sites located with 200m of the ARN assessed within **Chapter 7** Air Quality **[TR020001/APP/5.01]** are included in this chapter as the contribution of the Proposed Development to change in air quality were found to be less than 1% (Ref. 8.58) of the relevant air quality objective and Critical Loads for this habitat.

Species

Orchids

Assessment Phase 1

8.9.88 The operation of the provision of open space will introduce additional recreational pressures into the retained area that supports orchid populations. Such pressures may include trampling and a change in soil pH due to nitrification through dog urine. The orchids are located within what is currently an area of set-aside on the southern edge of an arable field to the south of Wandon End. An existing public right of way runs through this area, however the footfall will increase once the provision of open space is established. The provision of open space has been designed to include defined footpaths and signage to channel the public away from sensitive retained habitats, and this will reduce the impact on the orchid population, however it is anticipated that an impact will remain. The embedded mitigation which forms part of assessment Phases 1, 2a and 2b construction includes creation of neutral and calcareous grassland, and also bare chalk slopes, which are highly suitable for pyramidal and bee orchids, as detailed within the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**).The degradation of the orchid population retained within the provision of open space as a result of recreational pressures represents a

permanent adverse impact, of low magnitude, on this district value receptor. This equates to a **minor adverse effect** which is **not significant**.

Assessment Phase 2a and Phase 2b

8.9.89 It is not anticipated that the operation of assessment Phase 2a or 2b of the Proposed development will result in additional impacts upon the local orchid population.

Badger

Assessment Phase 1

8.9.90 The assessment Phase 1 works for the Proposed Development include the provision of temporary car parks in the former location of Wigmore Park CWS, as well as the provision of open space. The operation of the car park will introduce additional noise and lighting disturbance to the remaining adjacent habitats at Wigmore Park which are utilised as a foraging and sett building resource by badgers. The provision of open space will introduce additional people and dogs within proximity to retained main badger setts and badger foraging habitats. Given the existing high levels of background noise, lighting and visual disturbance associated with the operational airport, it is anticipated that the local badger social groups will have a high tolerance for such disturbance as is typical for this species. The provision of open space has been designed with defined footpaths to try to channel people away from retained habitats and sensitive ecological features such as the main badger sett. These measures will help to reduce any disturbance impacts on badgers utilising the adjacent habitats. The disturbance to badger foraging habitats and setts, as a result of the operation of the assessment Phase 1 Works of the Proposed Development, represents a permanent adverse impact, of very low magnitude, on this local level receptor. This equates to a **negligible effect**, which is **not significant**.

Assessment Phase 2a

8.9.91 The assessment Phase 2a works for the Proposed Development include the provision of car parks, roads, water treatment plant, and fuel storage facility, as well as the provision of further areas of habitat creation and landscape restoration. The fuel line will be underground and therefore would incur no operational effects. The operation of the car parks, road and airport facilities will introduce additional noise and lighting disturbance to the retained surrounding habitats which are utilised as a foraging and sett building resource by badger. At this stage, the provision of open space and habitat creation areas for assessment Phase 1 would have matured and be available for use by badger. Given the existing high levels of background noise, lighting and visual disturbance associated with the operational airport, it is anticipated that the local badger social groups will have a high tolerance for such disturbance. The disturbance to badger foraging habitats and setts, as a result of the operation of the assessment Phase 2a of the Proposed Development, represents a permanent adverse impact, of very low magnitude, on this local level receptor. This equates to a **negligible effect**, which is **not significant**.

Assessment Phase 2b

8.9.92 It is not anticipated that the operation of assessment Phase 2b of the Proposed Development will result in additional impacts upon the local badger social groups.

Bats

Assessment Phase 1

8.9.93 The assessment Phase 1 works include the provision of temporary car parks adjacent to the retained section of Wigmore Park, along with increased take-off/landing activity. The light spill from these temporary carparks has the potential to result in displacement and loss of foraging habitats. Embedded mitigation includes lighting design, creation of a bund south west of the retained part of Wigmore Park CWS and habitat creation at the margin of the Proposed Development will act as further screening once matured to that provided by the retained trees. These works therefore have the potential to represent a temporary adverse impact until habitats mature (5-10 years), of low magnitude on this district value receptor. However, with the embedded mitigation, including measures detailed within the CoCP (**Appendix 4.2** of this ES **[TR020001/APP/5.02]**), this equates to a **minor adverse effect** in the short term, reducing to a **negligible** level, which is **not significant**.

Assessment Phase 2a

8.9.94 Assessment Phase 2a of the Proposed Development includes the extension of the airport platform and associated infrastructure within close proximity to retained habitats such as woodlands and retained commuting routes. This in combination with the increased take-off/landing activity will result in an increase in noise and lighting levels. This has the potential to impact upon bats that utilise these habitats as a commuting, foraging or roosting resource, by introducing additional disturbance through noise and vibration. Where the infrastructure is used in the hours of darkness there is the potential for disturbance to commuting and foraging bats; where used in the day time there is the potential to disturb the roosting sites of common bat species in adjacent retained habitats. Embedded mitigation includes sensitive lighting design to reduce light spill, creation of a bund south west of the retained part of Wigmore Park CWS, and habitat creation at the margin of the Proposed Development to act as further screening to that provided by the retained trees. Assessment Phase 2a therefore has the potential to represent a permanent adverse impact, of medium magnitude in the short term on this district value receptor due to close proximity to retained habitats. This equates to a **moderate adverse effect** in the short term, which is **significant**, reducing to a **minor adverse** level in the long term as habitats mature (5-10 years), which is **not significant**.

Assessment Phase 2b

8.9.95 The increased take-off/landing activity and the operation of the airport infrastructure within proximity to retained habitats will result in an increase in noise and light levels. This has the potential to impact upon bats that utilise these habitats as a commuting, foraging or roost resource, by introducing

additional disturbance through noise and vibration. Where the infrastructure is used in the hours of darkness there is the potential for disturbance to commuting and foraging bats; where used in the daytime, there is the potential to disturb the roosting sites of common bat species in adjacent retained habitats. Embedded mitigation includes sensitive lighting design to reduce light spill, creation of a bund south west of the retained part of Wigmore Park CWS, and habitat creation at the margin of the Proposed Development to act as further screening to that provided by the retained trees, along with maturing of the assessment Phase 1 and 2b habitat creation areas further from the airport. This has the potential to represent a permanent adverse impact, of low magnitude on this district value receptor. This equates to a **minor adverse effect**, reducing to a **negligible** level as screening habitats mature (5-10 years), which is **not significant**.

Sensitivity Analysis

8.9.96 There are certain known scenarios or risks that may occur that could influence the conclusions of the Core Planning Case assessment. These scenarios and the general approach to considering them in this assessment are described in **Section 5.4** of **Chapter 5** Approach to the Assessment, of this ES **[TR020001/APP/5.01]**.

8.9.97 **Table 8.15** provides a qualitative assessment of any likely changes to the conclusions of the assessment reported in this chapter, in the event that that the given scenario or risk is realised.

Table 8.15: Qualitative Sensitivity Analysis

Sensitivity scenario	Potential impact and change	Likely effect
1-19 mppa Application	An increase in the assumed baseline capacity from 18 to 19 mppa is considered not to change the assessed impacts on biodiversity assuming no change in the footprint and layout of the Proposed Development occurs.	No change
2- Faster Growth	A rise in passenger demand and higher passenger throughput quicker than predicted is considered not to change the assessed impacts on biodiversity assuming no change in the footprint and layout of the Proposed Development occurs.	There were no changes to the significance of impacts or impact of compliance predicted for this sensitivity scenario across all assessment phases reported in **Chapter 7** Air Quality of this ES **[TR020001/APP/5.01]**. Where air quality effects occur on ecological receptors, they are reported within this biodiversity chapter as **Minor Adverse** to **Negligible**, **Not Significant** for

Sensitivity scenario	Potential impact and change	Likely effect
		all assessment Phases. Therefore, there is no likely change to the results.
3 - Slower Growth	A lower rate of forecast passenger demand and passenger throughput being achieved later than predicted is considered not to change the assessed impacts on biodiversity assuming no change in the footprint and layout of the Proposed Development occurs.	No change
4 – Next generation aircraft	An alternative long term fleet mix has been prepared which takes into account the next generation of aircraft (rather than existing new generation, such as the Max and Neo), which would have better environmental performance. These aircraft, which use technology not yet widely available, are expected to be zero emissions in flight and therefore the likely change would be a decrease in aircraft emissions in comparison to the Core Planning Case assessment.	It is likely there will be a reduction in the magnitude, and potentially significance, of the air quality effects on habitats as a result of the Proposed Development. This would be due to a likely reduction in the emissions when compared to those assessed for the Proposed Development.
5 - J10 without National Highways Smart Motorway upgrade (hard shoulder running scheme)	The Core Planning Case assumes the M1 south of Junction 10 will be upgraded to Smart Motorway, or other method, to provide all lane running and address current and predicted congestion on this stretch of the M1 in the future baseline without the Proposed Development, as agreed with National Highways. This sensitivity test assumes that all lane running is not delivered and the M1 continues to operate as is. Surface access traffic modelling has been undertaken and a quantitative assessment has been undertaken using that traffic data.	There were no changes to the significance of impacts or impact of compliance predicted for this sensitivity scenario across all assessment phases reported in **Chapter 7** Air Quality of this ES **[TR020001/APP/5.01]**. Therefore, there is no likely change to the results.
6 - Changes to airspace	This assessment is based on current flight paths as airspace change is being developed across the south east, not part of the Proposed Development, and will be subject to	Airspace changes are not expected to occur below 1,000 feet to the extent that it would change likely impact on local air quality as reported in

Sensitivity scenario	Potential impact and change	Likely effect
	other planning, assessment and approval processes. A sensitivity test of potential changes to airspace has been undertaken and is considered not to change the assessed impacts on biodiversity as no change in the footprint and layout of the Proposed Development occurs. In addition, the new flight paths do not bring in any new statutory designated sites within 30km.	**Chapter 7** of this ES **[TR020001/APP/5.01]**. The airspace changes are likely be accommodated within the Noise Envelope, as reported in **Chapter 16** of this ES **[TR020001/APP/5.01]**. Therefore, there is no likely change to the results.

8.10 Additional mitigation

8.10.1 This section describes the additional mitigation measures identified as a result of the assessment process, that are proposed in addition to those already considered to be in place as described in **Section 8.8** Embedded and good practice mitigation measures. These are proposed to reduce or mitigate those effects on biodiversity as a result of the construction and operation of the Proposed Development.

Design

8.10.2 There will be woodland habitat creation (4.37ha) and improvements to the ecological connectivity of the woodlands in the local area through strengthening of connected hedgerows and woodland belts, combined with visual screening benefits. A long-term management strategy of 50 years will be in place to maintain and enhance the site during operation of the Proposed Development, for details please refer to the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**).

8.10.3 In addition to the habitat creation measures within the provision of open space and landscape restoration areas, a large Habitat Creation Area (over 43ha) will be created to the east, as indicated on Landscape Mitigation Plans **Figures 14.11 to 14.13** of the ES **[TR020001/APP/5.03]**. This will include areas of low intensity grazed calcareous and neutral grassland as well as neutral meadow grassland and will not be available to the public for recreational use. These grasslands would be managed, including through measures such as a reduction in fertilizer and herbicide inputs, to encourage the establishment of the notable plant species lost to construction of the Proposed Development (Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**). It is anticipated that such measures and inclusion of maintaining elements of bare ground on bunds and selected field margins through lower cuts and up to annual turnover of the ground in discrete areas, will reduce the effect of the loss of arable field margins, and their associated notable arable plants, as a result of the construction of the Proposed Development to a level that is not significant.

8.10.4 As shown in the Landscape Mitigation Plans **Figures 14.11 to 14.13** of the ES **[TR020001/APP/5.03]** and Strategic Landscape Masterplan Report **[TR020001/APP/5.10]**, Off-site hedgerow restoration will be implemented to strengthen and improve the existing hedgerow network to the north east and east of the Main Application Site, along with small areas to the south (for details please refer to the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**). These will improve not only the condition of the habitats themselves, but also the function they provide as wildlife corridors for a range of species including bats, badger and invertebrates.

8.10.5 Areas of these habitat creation fields would be managed appropriately to provide replacement resource for local over-wintering farmland bird populations through variation (please refer to the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**). These areas will comprise strips of rough grassland to provide suitable cover and foraging for these species. The management will be aimed at small passerine bird species such as finches and buntings such as the

yellowhammer and will focus on the outer areas of the habitat creation fields at greatest distance from the runway and flight lines to minimise the risk of increasing bird strike.

8.10.6 As far as possible, the Off-site Car Parks at Luton Parkway will be designed to minimise loss of the adjacent Luton Parkway Verges DWS and habitats that could support protected species, as per Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**).

Construction

8.10.7 Tree clearance works would be under a watching brief and/or monitored by an Ecological Clerk of Works or bat licence appointed person where appropriate. Any trees which are to be removed that have been identified as having low, moderate or high bat roost potential (but are not confirmed roosts) within the Proposed Development will be soft felled. Those confirmed as bat roosts will also be soft felled but under a bat mitigation licence once secured, as described in the Bat Mitigation Strategy, **Appendix 8.8** of this ES **[TR020001/APP/5.02]**.

8.10.8 In addition to the habitat creation measures within the provision of open space, measures will be adopted to mitigate the loss of invertebrate habitats (for details please refer to the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**) and the Orchid and Invertebrate Mitigation Strategy, **Appendix 8.10** of this ES **[TR020001/APP/5.02]**. This includes but is not limited to:

a. Translocation of orchid and bird's-foot trefoil (*Lotus corniculatus*) turfs from Wigmore Park to the habitat creation areas.
b. Off-site hedgerow restoration within the wider landscape around the Main Application Site to provide green corridors for invertebrates.
c. Retention of deadwood from trees felled for the Proposed Development and placement of this within hedgerows, and other retained habitats. This will comprise creation of log piles and where practicable this will also be erected as standing dead wood to replicate veteran trees.
d. Agricultural management of a low intensity grazing regime and limited herbicide, insecticide and fertilizer use, to encourage species diverse margins.

8.10.9 Due to the risk of attracting large birds and thus increasing the bird strike risk, it is not possible to include large replacement waterbodies for amphibians within the Proposed Development. A small cluster of wildlife ponds will be provided within the habitat creation area to the east of the provision of open space (as shown in the Landscape Mitigation Plans **Figures 14.11 to 14.13** of this ES **[TR020001/APP/5.03]**), these ponds will be managed to provide aquatic habitats for amphibians and reptiles such as grass snake while adhering to management to minimise the risk of bird strike. A translocation exercise will be undertaken to move animals from the ponds lost to the construction of the Proposed Development to the newly created pond (Amphibian and Reptile Mitigation Strategy, **Appendix 8.6** of this ES **[TR020001/APP/5.02]**).

8.10.10 Artificial bird nesting opportunities will be provided on buildings and retained trees within the Proposed Development appropriate for the species recorded within the Main Application Site; and, on arable land outside of the Main Application Site, which could include specific measures for tree sparrow (*Passer montanus*) (an LBAP species) (Outline LBMP, **Appendix 8.2** of this ES **[TR020001/APP/5.02]** and the Bird Mitigation Strategy, **Appendix 8.9** of this ES **[TR020001/APP/5.02]**). Artificial bird nesting provision will comply with bird strike restrictions.

8.10.11 Where bat roosts are lost or directly disturbed a Natural England mitigation licence is required to permit the loss and/or disturbance of these features. Such a licence will require the provision of artificial roost features within retained habitats within proximity to the lost roosts as a condition of being issued. Such artificial roosts will need to be provided prior to the loss/disturbance of any bat roost (Outline LBMP, **Appendix 8.2** of this ES **[TR020001/APP/5.02]** and the Bat Mitigation Strategy, **Appendix 8.8** of this ES **[TR020001/APP/5.02])**.

8.10.12 No excavation works involving heavy machinery will be undertaken within 30m of an active badger sett entrance hole without a Natural England development licence (Outline LBMP, **Appendix 8.2** of this ES **[TR020001/APP/5.02]** and the Badger Mitigation Strategy, **Appendix 8.7** of this ES **[TR020001/APP/5.02]**). Where badger setts are located within the construction zone these must be closed by a suitably qualified ecologist under licence from Natural England.

8.10.13 Badger setts lost to construction of the Proposed Development will be closed prior to construction under a Natural England badger development licence once secured (Outline LBMP, **Appendix 8.2** of this ES **[TR020001/APP/5.02]** and the Badger Mitigation Strategy, **Appendix 8.7** of this ES **[TR020001/APP/5.02]**). Any works carried out to exclude badgers from and then close a badger sett will be carried out between July and November inclusive in accordance with current best practice. A replacement artificial sett would only be required should any active main sett be lost to the Proposed Development, which is currently not anticipated, although detailed design stage will seek to retain any affected if possible. Any artificial setts required would be located in suitable areas of habitat away from sources of disturbance such as dog walkers. Artificial setts would also ideally be located within 100m of the sett they are replacing and within habitats currently used by the badger social group. The exact location of artificial setts would be agreed with Natural England as part of the badger development licence application.

8.10.14 An orchid translocation exercise will be undertaken to relocate orchids and their associated soils to pre-prepared receptor sites within the provision of open space and Habitat Creation Area (Outline LBMP, **Appendix 8.2** of this ES **[TR020001/APP/5.02]** and the Orchid and Invertebrate Mitigation Strategy, **Appendix 8.10** of this ES **[TR020001/APP/5.02]**). Orchids have an intricate relationship with their soil and the fungi they support. The receptor site will, therefore, be carefully prepared to ensure the soil, geological, aspect and hydrological conditions replicate those lost within Wigmore Park. The newly created habitats, particularly any areas of bare chalk, will also provide further opportunities for orchid growth and colonisation.

8.10.15 In addition to the habitat creation measures within the Main Application Site as described above, the wider hedgerow network within the immediate landscape around the Proposed Development will be strengthened through appropriate management of hedgerows, planting up gaps in existing hedgerows and planting new hedgerows where appropriate (over 6.5km) (Outline LBMP, **Appendix 8.2** of this ES **[TR020001/APP/5.02]**). This will be provided for ecological corridors between retained and created habitats within the Proposed Development with those foraging and shelter sites within the wider landscape and compensate for the loss of habitats utilised by species such as badgers, bats and birds within the Main Application Site.

8.10.16 Opportunities will be sought to provide barn owl nesting boxes within the wider landscape (within the Order Limits) at a safe distance from the airport, to avoid increasing the bird strike risk, to provide alternative barn owl nesting opportunities to those lost to construction of the Proposed Development (Outline LBMP, **Appendix 8.2** of this ES **[TR020001/APP/5.02]** and the Bird Mitigation Strategy, **Appendix 8.9** of this ES **[TR020001/APP/5.02]**).

Operation

8.10.17 Any remaining areas of Luton Parkway Verges DWS that fall within the LLAL ownership will be subject to management measures to promote the diverse botany for which the site is designated, and improve on its current scrub condition. This will include measures such as mowing and removal of arisings, and scrub management to prevent encroachment and shading. In order to reduce pressures, such as trampling by pedestrians and littering, upon the designating habitats of the DWS, post and rail fencing will be established to deter ‘cut throughs’ from the new car park, interpretation boards will be erected to explain the value of the DWS, monitoring and management for litter removal will be enacted. These measures are included within the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**).

8.10.18 The value of veteran trees is as a result of their age and the weather/disease/management processes that have occurred over the life of the tree. As such, the value of veteran trees cannot be replicated. Opportunities will be sought to implement sensitive management of retained veteran trees within the wider landscape, this may include measures such as thinning of young trees around veteran trees to reduce stresses upon the tree (Outline LBMP, **Appendix 8.2** of this ES **[TR020001/APP/5.02]**). Opportunities will also be explored to undertake ‘veteranisation’ of mature trees within the Applicant’s ownership. This would involve wounding the tree to encourage rot features to form and replicate the beneficial features of naturally occurring veteran trees.

8.10.19 Detailed design will include directional lighting methods such as smart LED lighting with integrated baffles, cowls or hoods, to avoid light spill onto retained and adjacent habitats and the species they support (as described in the **Design Principles** document **[TR020001/APP/7.09]**). Habitat creation and landscape restoration at the margins of the airport development and associated infrastructure will act as a screen between the Proposed Development and adjacent habitats.

8.11 Residual effects

8.11.1 In addition to embedded design and good practice mitigation measures, further habitat creation and management measures have been proposed to mitigate the loss of habitats, and the species which they support, due to construction of the Proposed Development as detailed above. It is, however, recognised that there is a lag time between the loss of habitats to construction and the establishment of replacement habitats to a level where they provide equivalent biodiversity value to those lost. Residual effects are detailed in the assessment summary **Table 8.17**.

Construction

Designated nature conservation sites

Wigmore Park CWS

Assessment Phase 1

8.11.2 The Proposed Development includes additional land for habitat creation where required as part of the biodiversity net gain strategy (**Appendix 8.5** Biodiversity Net Gain (BNG) Report of this ES **[TR020001/APP/5.02]**) and shown in **Figures 14.11 to 14.13** of this ES **[TR020001/APP/5.03]**, to those habitat creation measures included in the design. It is, however, recognised that time is required for these measures to establish to a level at which they provide an equivalent biodiversity value to that lost to the Proposed Development at Wigmore Park CWS. Therefore, the proposed habitat does not initially fully mitigate the loss of biodiversity at the CWS. There will be a temporary **minor adverse residual effect** while the additional habitats creation areas establish, decreasing to a residual **negligible effect** following maturation after 10-15 years due to the increased area, which is **not significant**.

Assessment Phase 2a

8.11.3 No additional mitigation has been proposed with respect to construction effects on Wigmore Park CWS. As such the effects would be as reported in **Section 8.9**.

Assessment Phase 2b

8.11.4 Wigmore Park CWS is almost entirely lost to previous construction of assessment Phases of the Proposed Development, therefore the assessment Phase 2b construction works for the Proposed Development does not result in additional impacts upon Wigmore Park CWS.

Winch Hill Wood CWS/LWS Ancient Woodland

Assessment Phase 1

8.11.5 No significant residual construction effects are anticipated in assessment Phase 1, therefore please refer to the summary of the assessment of effects provided in **Table 8.17** in **Section 8.14**.

Assessment Phase 2a

8.11.6 The Proposed Development includes additional land for habitat creation where required as part of the net gain strategy (**Appendix 8.5** Biodiversity Net Gain (BNG) Report of this ES **[TR020001/APP/5.02]**) and shown in **Figures 14.11 to 14.13** of this ES **[TR020001/APP/5.03]**, to those habitat creation measures included in the design. This includes linking of habitats (e.g. planting new/ enhancing existing hedgerows) to improve connectivity within the wider landscape. This woodland will also be managed to improve its condition, as described in the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**). These measures will reduce the impact of the loss of connecting ecological corridors; however, given the time required for habitats to establish to a level at which they provide an equivalent biodiversity resource to that lost (5-15 years), and for the enhancement of the woodland to be show improvement (10-12 years) a temporary adverse impact, of low magnitude, on the structure and function of the county value site. This equates to a **minor adverse effect** in the short term, which is **not significant**, leading to a residual **negligible effect** in the long term which is **not significant**.

Assessment Phase 2b

8.11.7 No significant construction effects are anticipated in assessment Phase 2b, refer to the summary of the assessment of effects provided in **Table 8.17** in **Section 8.14**.

Dairyborn Scarp DWS

Assessment Phase 1

8.11.8 No significant residual construction effects are anticipated in assessment Phase 1, therefore please refer to the summary of the assessment of effects provided on **Table 8.17** in **Section 8.14**.

Assessment Phase 2a

8.11.9 The Proposed Development includes additional land for habitat creation where required as part of the net gain strategy (**Appendix 8.5** Biodiversity Net Gain (BNG) Report of this ES **[TR020001/APP/5.02]**) and shown in **Figures 14.11 to 14.13** in of this ES **[TR020001/APP/5.03]**, to those habitat creation measures included in the design. This site will also be managed to improve its condition, as per the Outline LBMP (**Appendix 8.2**, of this ES **[TR020001/APP/5.02]**). These measures will reduce the impact of the loss of habitats; however, given the time required for habitats to establish to a level at which they provide an equivalent biodiversity resource to that lost (5-15 years), a temporary adverse impact, of low magnitude, on the structure and function of the district value site. This equates to a **minor adverse effect** in the short term, which is **not significant**, leading to a residual **negligible effect** in the long term which is **not significant**.

Assessment Phase 2b

8.11.10 No significant residual construction effects are anticipated in assessment Phase 2b, therefore please refer to the summary of the assessment of effects provided on **Table 8.17** in **Section 8.14**.

Luton Parkway Verges DWS

Assessment Phase 1

8.11.11 No significant residual construction effects are anticipated in assessment Phase 1, therefore please refer to the summary of the assessment of effects provided in **Section 8.14**.

Assessment Phase 2a

8.11.12 The Proposed Development includes additional land for habitat creation to that included in the design, where required as part of the biodiversity net gain strategy (**Appendix 8.5** Biodiversity Net Gain (BNG) Report of this ES **[TR020001/APP/5.02]**) and shown in **Figures 14.11 to 14.13** of this ES **[TR020001/APP/5.03]**. These measures will reduce the impact of the loss of habitats; however, given the time required for habitats to establish to a level at which they provide an equivalent biodiversity resource to that lost (5-10 years), a temporary adverse impact, of low magnitude, on the structure and function of the district value site. This equates to a **minor adverse effect** in the short term, which is **not significant**, remaining a residual **minor adverse effect** in the long term which is **not significant** as the habitat will be created away from the DWS unless areas can be retained and managed within the Order Limits following detailed design. The additional mitigation includes large areas of neutral grassland which will be managed for 50 years, replacing a small section of largely scrubbed over grassland verges, which will be partly retained if detailed design permits.

Assessment Phase 2b

8.11.13 No significant residual construction effects are anticipated in assessment Phase 2b, therefore please refer to the summary of the assessment of effects provided on in **Section 8.14**.

Habitats

8.11.14 Mitigation has been proposed with respect to construction effects on habitats included within the CoCP, **Appendix 4.2** of the ES **[TR020001/APP/5.02]**. Additional areas of planting within the Habitat Creation Area bring the effects of loss of habitats to levels which are **not significant**. As such the effects would be as reported in **Section 8.9**.

Species

Orchids

Assessment Phase 1

8.11.15 An orchid translocation exercise together with additional neutral and calcareous grassland creation are proposed, as described in **section 8.10**, to mitigate the partial loss of the orchid assemblage at Wigmore Park to the assessment Phase 1 works for the Proposed Development. The receptor sites will be managed as described in the Outline LBMP (**Appendix 8.2**, of this ES **[TR020001/APP/5.02]**) and the Orchid and Invertebrate Mitigation Strategy (**Appendix 8.10** of this ES **[TR020001/APP/5.02]**). It is recognised that there is a lag time between the loss of the original orchid habitats and establishment of replacement habitats to a level where they provide an equivalent biodiversity value to that lost. On the successful completion of the orchid translocation exercise, a temporary adverse impact, of low magnitude, on this district value receptor remains. This equates to a residual **minor adverse effect**, which is **not significant**, decreasing to a residual **negligible effect** once the calcareous and neutral grasslands have established within 5-10 years of suitable management, which is **not significant**.

Assessment Phase 2a

8.11.16 As reported for assessment Phase 1 (**paragraph 8.11.15**) for the loss of the remaining assemblage of orchids within Wigmore Park CWS to assessment Phase 2a construction.

Assessment Phase 2b

8.11.17 The construction of assessment Phase 2b of the Proposed Development is not anticipated to result in residual effects upon orchids.

Badger

Assessment Phase 1

8.11.18 The assessment Phase 1 works for the Proposed Development will result in the loss of four known outlier setts (two active, two disused) and associated areas of habitat. In addition, landscape and habitat creation works will affect/disturb four main setts (one now disused) and their associated outlier/annexe/subsidiary setts and partial territories, but it is assumed they can be retained. Following the closure of the outlier badger setts, in accordance with Natural England approved method statements under a badger development licence in advance of works on site, and following the establishment of habitat creation measures, as described in **Section 8.10**, the loss of the outlier setts and associated habitats to the assessment Phase 1 works for the Proposed Development will be reduced to a temporary adverse impact, of low magnitude, on this local value receptor. This equates to a **minor adverse** residual effect while replacement habitats establish (5-15 years), rising to residual **negligible** in the long term, which is **not significant**.

Assessment Phase 2a

8.11.19 The construction of assessment Phase 2a for the Proposed Development will result in the potential loss or disturbance of a currently disused main badger sett and associated habitats to earthworks and creation of the fuel storage facility and water treatment plant, and disturbance to one other active main badger sett and loss of three subsidiaries (one disused), and loss/disturbance to multiple outlier badger setts for the fuel pipeline, along with creation of the landscape restoration and habitat creation areas. The closure of the disused main badger sett, if needed, would not form part of a method statement to be submitted to Natural England for approval, nor require a replacement sett unless it becomes active prior to construction of this assessment Phase. Disturbance to another main and loss/disturbance to three subsidiaries (one disused), several outlier setts and associated foraging habitats, due to the construction of assessment Phase 2a of the Proposed Development will be reduced to a temporary adverse impact, of low magnitude, on this local value receptor following establishment of habitat creation measures. This equates to a residual **minor adverse effect**, which is **not significant**, decreasing to a residual **negligible effect** once the grassland, scrub and hedgerow habitats have established within 5-15 years, which is **not significant**.

Assessment Phase 2b

8.11.20 The construction of assessment phase 2b will result in disturbance of badger setts during works and habitat creation, landscape restoration. A temporary adverse impact, of low magnitude, will occur on these local value populations resulting in a **negligible effect** in the long term, which is **not significant**. Further habitat creation and landscape restoration will be put in place in assessment Phase 2b, and as by assessment Phase 2b, the habitat creation for earlier assessment phases will have matured, this will lead to a residual **minor beneficial effect** in the long term, which is **not significant**.

Bats

Assessment Phase 1

8.11.21 Additional habitat creation measures, as described within **Section 8.10**, are proposed to mitigate the loss of foraging habitats and severance of commuting routes used by the local bat assemblage to the construction of assessment Phase 1 of the Proposed Development. This includes the off-site hedgerow enhancements in the wider area. Additional mitigation including cowls in appropriate areas will further reduce light spill. It is recognised that there is a lag time between the loss of habitat to construction and the establishment of replacement habitats to a level at which they provide connectivity to existing and newly created foraging habitats within the wider landscape. A temporary adverse impact, of low magnitude, remains on this district value receptor. This equates to a residual **minor adverse effect**, which is **not significant**, decreasing to a residual **negligible effect** once habitats have established in 10-12 years, which is **not significant**.

8.11.22 The construction of assessment Phase 1 of the Proposed Development will result in the disturbance of three common pipistrelle bat roosts, namely the cottage at Winch Hill, a tree (T126) (**Figure 8.3** of this ES **[TR020001/APP/5.03]**) within nearby woodland, and a further roost at the Pillbox to the north of Wigmore Park. Following the implementation of a method statement to be approved by Natural England under a protected species mitigation licence in advance of works on site, and provision of suitably located artificial bat roost provision, as described in **Section 8.10** and the Bat Mitigation Strategy, **Appendix 8.8** of this ES **[TR020001/APP/5.02]**, the disturbance of the roosts during the construction of assessment Phase 1 of the Proposed Development will be reduced to a permanent adverse impact, of very low magnitude, on this local value receptor. This equates to a residual **negligible effect**, which is **not significant**.

Assessment Phase 2a

8.11.23 Additional habitat creation measures, as described within **Section 8.10** are proposed to mitigate the loss of foraging habitats and severance of well used commuting routes used by the local bat assemblage to the construction of assessment Phase 2a of the Proposed Development. This includes the off-site hedgerow enhancements in the wider area. Additional mitigation including cowls in appropriate areas will further reduce light spill. It is recognised that there is a lag time between the loss of habitat to construction and the establishment of replacement habitats to a level at which they provide connectivity to existing and newly created foraging habitats within the wider landscape. A temporary adverse impact, of low magnitude, remains on this district value receptor. This equates to a residual **minor adverse** effect, which is **not significant**, decreasing to a residual **negligible effect** once habitats have established in 10-12 years, which is **not significant**.

8.11.24 The construction of assessment Phase 2a of the Proposed Development will result in the loss of one common pipistrelle tree roost (T104) (**Figure 8.3** of this ES **[TR020001/APP/5.03]**) , and disturbance of two common pipistrelle bat tree roosts (T120 and T124) plus the building roost in the Pillbox. Following the implementation of a method statement to be approved by Natural England, and provision of suitably located artificial bat roost provision, as described in **Section 8.10** and the Bat Mitigation Strategy, **Appendix 8.8** of this ES **[TR020001/APP/5.02]**, the effect on the roosts from the construction of assessment Phase 2a of the Proposed Development will be reduced to a permanent adverse impact, of very low magnitude, on this local value receptor. This equates to a residual **negligible** residual effect, which is **not significant**.

Assessment Phase 2b

8.11.25 Additional habitat creation measures, as described within **Section 8.10** are proposed to mitigate the loss of foraging habitats and severance of well used commuting routes used by the local bat assemblage to the construction of assessment Phase 2b of the Proposed Development. This includes the off-site hedgerow enhancements in the wider area. Additional mitigation including cowls in appropriate areas will further reduce light spill. It is recognised that there is a lag time between the loss of habitat to construction and the establishment of

replacement habitats to a level at which they provide connectivity to existing and newly created foraging habitats within the wider landscape. A temporary adverse impact, of low magnitude, remains on this district value receptor. This equates to a residual **minor adverse effect**, which is **not significant**, decreasing to a **negligible** residual effect once habitats have established in 10-12 years, which is **not significant**.

8.11.26 The construction of assessment Phase 2b of the Proposed Development will result in the loss of two small common pipistrelle bat roosts (T120 and T124) (**Figure 8.3** of this ES **[TR020001/APP/5.03]**) within the woodland belt to the west of Winch Hill Wood, and further disturbance of a tree (T126) near to Winch Hill. Following the implementation of a method statement to be approved by Natural England, and provision of suitably located artificial bat roost provision, as described in **Section 8.10** and the Bat Mitigation Strategy, **Appendix 8.9** of this ES **[TR020001/APP/5.02]**, the effect on the roosts from the construction of assessment Phase 2b of the Proposed Development will be reduced to a permanent adverse impact, of very low magnitude, on this local value receptor. This equates to a residual **negligible** residual effect, which is **not significant**.

Amphibians

Assessment Phase 1

8.11.27 Habitat creation includes a cluster of small wildlife ponds and an amphibian translocation exercise is proposed, as described within **Section 8.10** and the Amphibian and Reptile Mitigation Strategy, **Appendix 8.6** of this ES **[TR020001/APP/5.02]**, to mitigate the loss of pond and terrestrial habitats and associated risk of killing or injuring amphibians during the assessment Phase 1 works for the Proposed Development. The ponds will be created at least 6 months in advance of the existing pond being lost to ensure it has time to become established and for the water chemistry to settle. However, it is recognised that there is a lag time between the loss of the original pond and the establishment of the replacement pond to a level where they provide an equivalent biodiversity resource, although the majority of ponds to be lost comprise drainage ponds or fire training ponds associated with the current airport infrastructure and therefore are of limited biodiversity value. It is also recognised that there is a lag time between the loss of terrestrial habitat to construction and the establishment of replacements within the habitat creation areas, to a level at which they provide connectivity to existing and newly created foraging habitats within the wider landscape. Translocation of amphibians will be undertaken to suitable replacement habitat during drain-down of ponds within the Main Application Site. A temporary adverse impact, of medium magnitude, remains on this district value receptor. This equates to a residual **minor adverse effect**, which is **not significant**, decreasing to a **negligible** residual effect once habitats have established in 5-10 years, which is **not significant**.

Assessment Phase 2a and 2b

8.11.28 No additional ponds will be created as further mitigation in these assessment phases, and although additional areas of terrestrial habitat will be created and lost, there will remain a **negligible** adverse effect, which is **not significant**.

Operation

Designated nature conservation sites

Winch Hill Wood CWS/LWS Ancient Woodland

Assessment Phase 1

8.11.29 Management of Winch Hill Wood CWS/LWS/AW is included within the Outline LBMP (**Appendix 8.2**, of this ES **[TR020001/APP/5.02]**). This has the aim of improving the condition of the site over a 50 year period from assessment Phase 1. The woodland will also be subject to an existing level of air quality effects from the current use of the airport. The air quality impacts of the Proposed Development will be a **minor adverse** effect, which is **not significant**. The management practices implemented will commence at assessment Phase 1 and will lead to improvement of the woodland overall, but as this will take time to achieve, the air quality impact will remain as a **minor adverse** effect, which is **not significant**.

Assessment Phase 2a and 2b

8.11.30 Management of Winch Hill Wood CWS/LWS/AW is included within the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**). This has the aim of improving the condition of the site over a 50 year period from assessment Phase 1. The woodland will also be subject to an existing level of air quality effects from current use of the airport and other causes such as agriculture. The additional and long-term management of the woodland will mean that there will be a temporary **minor adverse** effect as a result of air quality in the short term, falling to a **negligible adverse** impact in the long term, which is **not significant** once the management practices implemented shows improvement of the woodland overall. These management practices will commence at assessment Phase 1 and so would already be showing benefit by assessment Phase 2a and 2b.

Luton Parkway Verges DWS

Assessment Phase 1

8.11.31 There will be no operational effects on Luton Parkway Verges DWS with the exception of air quality which is as reported in **Table 8.17**.

Assessment Phase 2a and Phase 2b

8.11.32 Management of any remaining areas of the DWS within the Order Limits is included within the Outline LBMP (**Appendix 8.2**, of this ES **[TR020001/APP/5.02]**). This has the aim of improving the condition of the site over a 50-year period from assessment Phase 2a. The additional and long-term

management of the remaining site within the Order Limits will mean that there will be a temporary **minor adverse** effect as a result of air quality in the short term, falling to a **negligible adverse** impact in the long term, which is **not significant** once the management practices implemented shows improvement of the DWS overall. These management practices will commence at assessment Phase 2a once the car park at this location has been completed if any area of the DWS at this location has been retained or reinstated. No management will be applied to the section of DWS outside of the Order Limits and will remain as a permanent **minor adverse** effect which is **not significant**.

8.11.33 In order to reduce trampling pressures and littering, upon the habitats of any remaining areas of the DWS within the Proposed Development, post and rail fencing will be established to deter 'cut throughs' from the new car park. Interpretation boards will be erected to explain the value of the DWS, and monitoring and management for litter removal enacted. These measures are detailed within the Outline LBMP (**Appendix 8.2**, of this ES **[TR020001/APP/5.02]**). Following implementation of these measures during assessment Phase 2a and Phase 2b, there will remain a **negligible** residual effect, which is **not significant** on all but the shading effects. No mitigation can be provided for the potential shading effect which remains a residual **minor adverse effect**, which is **not significant**.

Dairyborn Scarp DWS

Assessment Phase 1

8.11.34 Management of Dairyborn Scarp DWS is included within the Outline LBMP (**Appendix 8.2**, of this ES **[TR020001/APP/5.02]**). This has the aim of improving the condition of the site over a 50-year period from assessment Phase 1. The DWS will also be subject to an existing level of air quality effects from the current use of the airport. The air quality impacts of the Proposed Development will be a **minor adverse** effect, which is **not significant**. The management practices implemented will commence at assessment Phase 1 for retained habitats and will lead to improvement of the DWS overall, but as this will take time to achieve, the air quality impact will remain as a **minor adverse** effect, which is **not significant**.

Assessment Phase 2a and 2b

8.11.35 Management of Dairyborn Scarp DWS is included within the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**). This has the aim of improving the condition of the site over a 50-year period from assessment Phase 1. The DWS will also be subject to an existing level of air quality effects from current use of the airport and other causes such as agriculture. The additional and long term management of the DWS within the Order Limits will mean that there will be a temporary **minor adverse** effect as a result of air quality in the short term, falling to a **negligible adverse** impact in the long term, which is **not significant** once the management practices implemented shows improvement of the habitats overall. These management practices will commence at assessment Phase 1 for retained habitats, and at assessment Phase 2a for created habitats

following the assessment Phase 2a construction, and so would already be showing benefit by assessment Phase 2a and 2b.

Burnt Wood LWS

8.11.36 No additional mitigation has been proposed/is practicable with respect to operational effects on Burnt Wood LWS as it lies outside of the Order Limits. As such the effects would be as reported in **Section 8.9**.

Kidney and Bull Woods CWS / Ancient Woodland

8.11.37 No additional mitigation has been proposed/is practicable with respect to operational effects on Kidney and Bull Woods CWS and ancient woodland as it lies outside of the Order Limits. As such the effects would be as reported in **Section 8.9**.

Luton Hoo Park CWS / River Lea CWS

8.11.38 No additional mitigation has been proposed/is practicable with respect to operational effects on Luton Hoo Park CWS and River Lea CWS as it lies outside of the Order Limits. As such the effects would be as reported in **Section 8.9**.

Habitats

8.11.39 No additional mitigation has been proposed/is required with respect to operational effects on habitats. As such the effects would be as reported in **Section 8.9**.

Species

Orchids

Assessment Phase 1

8.11.40 An orchid translocation exercise and additional calcareous grassland creation are proposed, as described in **Section 8.10**, to mitigate the loss of orchid habitats. The translocation exercise will utilise two receptors sites, one within the provision of open space (receptor site 1, within the Orchid and Invertebrate mitigation strategy, **Appendix 8.5** of the ES **[TR020001/APP/5.02])**, where the orchids will be accessible by members of the public and therefore subject to a degree of recreational pressure, deterred through defined footpaths and signage, and another location (receptor site 2) within the wider Habitat Creation Area away from areas of anticipated high footfall. Following the successful establishment of translocated orchids to the two receptor areas, a permanent adverse impact, of very low magnitude, on this district value receptor remains. This equates to a residual **negligible effect**, which is **not significant**.

Assessment Phase 2a and 2b

8.11.41 It is not anticipated that the operation of assessment Phase 2a and 2b of the Proposed development will result in additional impacts upon the local orchid population.

Badger

All assessment Phases

8.11.42 The provision of open space has been designed with defined footpaths to try to direct people away from retained habitats (Badger Mitigation Strategy, **Appendix 8.7** of this ES **[TR020001/APP/5.02]**). These measures will help to reduce disturbance impacts on badgers utilising the adjacent habitats. The Habitat Creation Area will not be subject to the same recreational pressure. The disturbance to badger foraging habitats and setts, as a result of the operation of all assessment phases of the Proposed Development, represents a permanent adverse impact, of very low magnitude, on this low value receptor. This equates to a residual **negligible effect**, which is **not significant**.

Bats

All assessment Phases

8.11.43 Additional habitat creation areas, and strengthening of hedgerow and woodland ecological corridors both within the Order Limits and in the wider landscape (hedgerow enhancements), are proposed as detailed within **Section 8.10**. These measures will provide connectivity to alternative habitat resources within the wider landscape for bats, leading them away from the Proposed Development. Additional mitigation provided, including cowls in appropriate areas will further reduce light spill (as described in the **Design Principles** document **[TR020001/APP/7.09]**). Artificial roost provision a suitable distance from the airport for bats (Bat Mitigation Strategy, **Appendix 8.8** of this ES **[TR020001/APP/5.02]**). It is recognised that there is a lag time between the operational impact of assessment Phase 1 of the Proposed Development upon bat habitats and the establishment of habitat creation measures, including those that provide a screening effect, therefore a permanent adverse impact, on this district value receptor remains. This equates to a residual **negligible residual** effect once habitats have established in 5-10 years, which is **not significant**.

Bird strike risk

All assessment Phases

8.11.44 The creation of suitable nesting and foraging habitats further from the Proposed Development may result in these areas being preferentially used by species such as red kite and barn owl and others which may pose a bird strike risk (Bird Strike Risk assessment**, Appendix 8.4** of this ES **[TR020001/APP/5.02]**), with known nesting sites immediately south and east of the Proposed Development.

8.11.45 Once habitat creation areas further from the Proposed Development have matured, it may encourage their use instead of those habitats which were closer to the existing airport, thereby leaving a potential residual **minor beneficial effect**, which is **not significant**.

Schedule 1 birds – Barn owl and Red kite

All assessment Phases

8.11.46 Artificial roost provision will be included at a suitable distance from the airport for barn owl, in addition to the embedded mitigation (Bird Mitigation Strategy, **Appendix 8.9** of this ES **[TR020001/APP/5.02]**).

8.11.47 Additional creation of grassland, hedgerows and woodland will provide alternative foraging and nesting opportunities for both barn owl and red kite away from the airport which will encourage them to remain at a distance, where disturbance and risk of bird strike will be reduced. There will remain a temporary **minor adverse** residual effect while replacement habitats establish (5-10 years), reducing to **negligible** in the long term, which is **not significant**.

8.12 In-combination climate change effects

8.12.1 This section provides an assessment of potential changes to the findings of the biodiversity assessment, taking into account the predicted future conditions as a result of climate change, known as In-combination Climate Change Impacts (ICCI).

8.12.2 This assessment has been undertaken using the methodology and climate change predictions described in **Chapter 9** of this ES **[TR020001/APP/5.01]**. The results are provided in **Table 8.16**.

Table 8.16: Biodiversity in-combination climate change impacts

Climate hazard	Likelihood of climate hazard occurring	ICCI identified	Consequence of ICCIs considering embedded environmental measures/good practice	Likelihood of ICCI occurring	Consequence	Significance of ICCI effects
Increase in mean annual air temperature	Frequent	Degradation of ecosystem services and reduced food availability.	The proposed habitat creation/enhancement has been designed to link existing habitats and provide a larger expanse of biodiverse semi-natural habitat. This will provide a variety of fauna with a varied and increased food source, that will help boost their resilience to the impacts of future temperature change. Further details of how these habitats will be created and managed can be found within the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**).	Remote	Very low	Negligible Not significant
Decrease in annual precipitation rate	Frequent	Further impacts to retained sensitive habitats and reduced success of new planting	The Drainage Design Statement (**Appendix 20.4** of this ES [**TR020001/APP/5.02**]) will ensure that there is no significant change to water availability within retained habitats and has accounted for future climate changes, including reduced water	Remote	Very low	Negligible Not significant

Climate hazard	Likelihood of climate hazard occurring	ICCI identified	Consequence of ICCIs considering embedded environmental measures/good practice	Likelihood of ICCI occurring	Consequence	Significance of ICCI effects
			availability. Resilience of landscaping to climate change will be ensured by the habitat creation/enhancement requirements provided within the ES to ensure that climate change is taken into consideration in the choice of species and adequate monitoring post-planting occurs in accordance with the Outline LBMP (**Appendix 8.2** of this ES [**TR020001/APP/5.02]**).			
Increased number and frequency of hot days; increase of droughts	Frequent	Reduced success of establishment of new planting due to hotter drier conditions	Landscape planting will take into consideration climate change in the selection of appropriate woodland tree and shrub species planting and habitat creation and adequate monitoring post-planting occurs in accordance with the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02])**.	Remote	Very low	Negligible Not significant
Increased frequency and intensity of heavy precipitation	Frequent	Reduced success of establishment of new planting due	Landscape planting will take into consideration climate change in the selection of appropriate woodland tree and shrub species planting and habitat creation and adequate	Remote	Very low	Negligible Not significant

Climate hazard	Likelihood of climate hazard occurring	ICCI identified	Consequence of ICCIs considering embedded environmental measures/good practice	Likelihood of ICCI occurring	Consequence	Significance of ICCI effects
		to wetter conditions	monitoring post-planting occurs in accordance with the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**).			

8.13 Monitoring

Construction monitoring

8.13.1 The lead contractors will be responsible for undertaking suitable monitoring throughout the construction works. The lead contractors will also hold responsibility for the implementation of mitigation measures to enable the effectiveness of these measures to be identified.

8.13.2 Prescriptions for the creation, establishment and monitoring of habitat creation measures are included within the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**) which will occur before, during and after construction.

8.13.3 Pre-construction monitoring surveys for the following species/groups is also detailed within the relevant documents below:

a. amphibian and reptile mitigation strategy, **Appendix 8.6** of this ES **[TR020001/APP/5.02]**;

b. badger mitigation strategy, **Appendix 8.7** of this ES **[TR020001/APP/5.02]**;

c. bat mitigation strategy, **Appendix 8.8** of this ES **[TR020001/APP/5.02]**;

d. bird mitigation strategy, **Appendix 8.9** of this ES **[TR020001/APP/5.02]**; and

e. orchid and invertebrates mitigation strategy, **Appendix 8.10** of this ES **[TR020001/APP/5.02]**.

8.13.4 The following monitoring is proposed and details are included within the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**);

a. Monitoring of installed exclusion zones and measures, including fences, will be undertaken to prevent accidental incursions on sensitive designated nature conservation sites and habitats such as, but not limited to, ancient woodland, semi natural woodland, ancient and veteran trees, calcareous grassland, watercourses and ponds.

b. Monitoring of INNS species will be undertaken, including those listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) (Ref 8.10) and the Invasive Alien species (Permitting and Enforcement) Order 2019 (Ref 8.14), and their proposed management and removal to ensure that no spread of these species occurs during construction.

c. Monitoring will be undertaken of measures implemented for biosecurity to reduce the risk that invasive non-native species and diseases are spread as a consequence of the Proposed Development.

d. Monitoring will be undertaken of measures included within the Bird Strike Risk Assessment (**Appendix 8.4** of this ES **[TR020001/APP/5.02]**), to ensure that no conditions occur that could pose a risk to aircraft, as a result of increased risk/severity of bird strike, including but not limited to ensuring no formation of large areas of surface water pooling.

e. Monitoring of the mitigation measures for badger during construction, including, should it be required, the creation of a main sett for badger (created in advance) would be conducted in accordance with the Natural England development licence.

f. Monitoring of the mitigation measures for bats, including of the use and maintenance of the installed bat boxes will be conducted in accordance with the Natural England mitigation licence.

g. Monitoring of the mitigation measures, including of the use of the site and the maintenance of the installed bird boxes will be conducted.

h. Monitoring of the created cluster of small wildlife ponds to advise on any action needed to ensure that the ponds retain sufficient water quality and levels, and continue to establish suitable aquatic planting will be conducted.

Operational monitoring

8.13.5 Prescriptions for the establishment, long term management and monitoring of habitat creation measures are included within the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**) and the BNG report, **Appendix 8.5** as part of this ES **[TR020001/APP/5.02]**.

8.13.6 Post construction monitoring surveys for the following species/groups is also detailed within the relevant documents below:

a. amphibian and reptile mitigation strategy, **Appendix 8.6** of this ES **[TR020001/APP/5.02]**;

b. badger mitigation strategy, **Appendix 8.7** of this ES **[TR020001/APP/5.02]**;

c. bat mitigation strategy, **Appendix 8.8** of this ES **[TR020001/APP/5.02]**;

d. bird mitigation strategy, **Appendix 8.9** of this ES **[TR020001/APP/5.02]**; and

e. orchid and invertebrates mitigation strategy, **Appendix 8.10** of this ES **[TR020001/APP/5.02]**.

8.13.7 The following monitoring is proposed and details are included within the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**) and the relevant mitigation strategies listed above;

a. Monitoring and management for litter removal will be enacted as per the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**).

b. Continuation of the monitoring and control measures employed by the airport operator to ensure no significant increase in bird strike risk, Bird Strike Risk Assessment (**Appendix 8.4** of this ES **[TR020001/APP/5.02]**).

c. Post construction monitoring of the mitigation measures for badger, including the use of the main sett, if a new sett is required, for badger will be conducted in accordance with the Natural England development licence.

d. Post construction monitoring of the mitigation measures for bats, including use of the site and the use and maintenance of the installed bat boxes will be conducted in accordance with the Natural England mitigation licence once secured.

e. Post construction monitoring of the mitigation measures, including of the use of the site and use and maintenance of the installed bird boxes will be conducted. Updated breeding bird and wintering bird surveys will be conducted in the relevant survey seasons for one year following construction of each assessment Phase to provide data on use of the site following construction.

f. Post construction monitoring of the orchid receptor sites will be conducted.

g. Post construction monitoring of the Roman snail sites (a visual check) will be conducted as part of invertebrate surveys in June for years two and five post construction of assessment Phase 2a (years 2038 and 2041), with additional monitoring conducted if a translocation of Roman snails is required. Monitoring of the dingy skipper butterfly will also be conducted and comprise walkover surveys mid-June for a period five years following construction of assessment Phase 1 (years 2028 to 2032).

h. Post construction monitoring of the created cluster of small wildlife ponds to ensure that the ponds continue to retain sufficient water quality and levels, and continue to establish suitable aquatic planting would be conducted within the appropriate season of April to September annually for five years post construction. Amphibian surveys to establish use of the ponds, would be conducted within the core period of mid-April to mid-June for year two and five post construction of the ponds (years 2029 and 2032).

i. Reptile surveys to establish use of appropriate habitats, would be conducted within the core period of mid-April to mid-May for year two and five post construction comprising four surveys per year.

8.14 Assessment summary

8.14.1 **Table 8.17** provides a summary of all of the identified impacts, mitigation and likely effects of the Proposed Development on biodiversity. Additional mitigation and how it will be secured are described and its efficacy shown by the reported residual effect.

8.14.2 This table only includes receptors that remain scoped in to the assessment. Those already scoped out are discussed within **Section 8.3** or the baseline conditions in **Section 8.7**.

8.14.3 In the long term, the Proposed Development is not anticipated to have any significant effect on biodiversity receptors within the study area. A number of effects have been identified as having initial significant adverse effects, prior to additional mitigation, but not in the long-term following adequate time for replacement habitats to have become established. An example of this is Wigmore Park CWS, which by assessment Phase 2a is almost completely lost, however with embedded mitigation as part of the provision of open space, the initial moderate adverse effect in the medium term, becomes a minor adverse effect once the habitats have developed. Furthermore, with the inclusion of additional mitigation such as the Habitat Creation Area, this is anticipated to become a negligible effect in the long term. From initial creation of the replacement habitats, often of higher biodiversity value than those lost, and throughout their establishment, these habitats will be managed in line with the 50-year management period as described in the Outline LBMP (**Appendix 8.2** of the ES **[TR020001/APP/5.02]**), to ensure their success.

8.14.4 A similar narrative applies to Winch Hill Wood CWS/LWS/Ancient Woodland, Luton Parkway Verges DWS, Dairyborn Scarp DWS, habitats such as broadleaved woodland and for the species which utilise them such as bats, and badger, all of which are subject to a long term negligible residual effect. Other habitat types, such as neutral semi-improved grassland result in an overall minor beneficial residual effect due to the large areas of additional grassland created as part of the Proposed Development, providing wide areas of habitat of increased biodiversity value for species such as bat, terrestrial invertebrates and breeding birds.

8.14.5 Due to the large areas of habitat creation, the Proposed Development has been calculated (using Defra Metric 3.1) to provide a greater than 10% biodiversity net gain, with a prediction of 12.05% for habitats and 31.51% for hedgerows following assessment Phase 1, and 10.85% for habitats and 18.5% for hedgerows following assessment Phases 2a and 2b, as shown within the BNG report, **Appendix 8.5** of the ES **[TR020001/APP/5.02]**.

8.14.6 In addition to the biodiversity net gain stated above, areas of off-site hedgerow restoration are provided in the wider area to the north and east, which further improves the habitat quality and the connectivity of the habitat for a range of species.

Table 8.17: Biodiversity preliminary assessment summary

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
Construction						
Wigmore Park CWS						
Assessment Phase 1 Loss of c.11.5ha (74.6%) of Wigmore Park CWS	Replacement habitat areas, and the provision of open space comprising 47.6ha (**Chapter 4** of this ES **[TR020001/APP/5.01]**).	High	Medium	The majority of loss of the key habitats of Wigmore Park CWS during assessment Phase 1, through site clearance and temporary surface car parks creation, represents an adverse impact, of high magnitude, on the structure and function of the county value site. This could equate to a **major adverse effect**, which is **significant**. However, embedded habitat mitigation will reduce this to **moderate adverse** in the medium term, which remains **significant,** decreasing to a **minor adverse effect** when vegetation reaches maturity in the long term, within 10-15 years.	Additional land for habitat creation where required within the Habitat Creation Area as part of the biodiversity net gain strategy (**Appendix 8.5** of this ES **[TR020001/APP/5.02]**) for project as shown in **Figures 14.11 to 14.13** of this ES **[TR020001/APP/5.03]**), will further add to the area of compensation habitats provided.	Temporary **minor adverse residual** effect while additional habitat creation areas establish, decreasing to a **negligible effect** following maturation after 10-15 years, which is **not significant**.
Assessment Phase 2a Loss of almost all remaining c.2.9ha (18.8%) of Wigmore Park CWS		Medium - smaller loss and already matured replacement habitats	Medium	The loss of almost all of the remainder of the key habitats of Wigmore Park CWS (hedgerows to the north to be incorporated into the open space) to the assessment Phase 1 works represents an adverse impact, of medium magnitude, on the structure and function of the county value site as the small amount left by assessment Phase 1 will be lost, but assessment Phase 1 habitat creation will have matured to some extent. This equates to a **moderate adverse effect**, which is **significant** in the short term. This will reduce to a **minor adverse** effect in the long term, which is **not significant,** when vegetation reaches maturity within 10-15 years.		
Assessment Phase 2b Only a further 5.4% (0.8ha) of Wigmore Park CWS lost during assessment Phase 2b leading to a 98.7% overall from a 93.4% in previous		N/A	Medium	Wigmore Park CWS no longer exists as a functional CWS by assessment Phase 2b of the Proposed Development, as by this assessment phase only 6.6% is remaining. During assessment Phase 2b a further 5.4% is lost, leaving only 1.3% comprising hedgerows incorporated into the provision of open space. At this stage, the provision of open space and habitat creation area for assessment Phases 1 and 2a will have matured, with		The overall long-term effect on this county value site equates to a **negligible effect**, which is **not significant**.

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
assessment phases.				additional areas created within assessment Phase 2b.		
Winch Hill Wood CWS/LWS Ancient Woodland						
Assessment Phase 1 Winch Hill Wood – minor loss of perimeter trees for arboriculture reasons	Retention of the woodland, with exception of minor tree removal on the perimeter, as recommended for arboricultural reasons only. Further woodland habitat creation within the Proposed Development, located within the provision of open space.	Very Low	Medium (as CWS and not SSSI for AW, also NVC reports site as low to low-mod botanical value)	**Minor adverse effect** as ancient woodland habitat which cannot be replaced, however the loss only relates to a small number of perimeter trees that were recommended for removal for arboricultural reasons, and may be partially in keeping with future management of the habitat. Permanent adverse impact, of very low magnitude, on the structure and function of the county value site. This equates to a **minor adverse effect**, which is **not significant**.	Woodland habitat creation and linking of habitats (e.g. planting new/ enhancing existing hedgerows) to improve connectivity within the wider landscape. Management of woodland for improvement, as per the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**).	**Negligible effect**, which is **not significant**.
Assessment Phase 2a Winch Hill Wood – deterioration of habitat due to isolation. Indirect effects from dust, noise and pollution. Changes to hydrological conditions.	Implementation of measures within the CoCP (**Appendix 4.2** of this ES **[TR020001/APP/5.02]**).to avoid indirect effects. Retention of the woodland, and inclusion of a buffer of at least 15m to avoid root damage and soil compaction to woodland trees. Further woodland habitat creation within the Proposed Development, located within the provision of open space. Also, hydrological management through the drainage design (described in **Appendix 20.4** of this ES **[TR020001/APP/5.02]**), to avoid significant changes to the existing hydrological conditions within Winch Hill Wood.	Low	Medium	Potential hydrological impacts are mitigated through the drainage strategy**,** refer to **Chapter 20** of this ES **[TR020001/APP/5.01]**. Further isolation and degradation through connecting habitat loss. Habitat creation measures partially mitigate the loss of connectivity. Implementation of habitat creation measures, including removing adjacent land from intensive agriculture, reduces the impact of the loss of connecting ecological corridors; however, given the time required for habitats to establish to a level at which they provide an equivalent biodiversity resource to that lost (5-15 years), a temporary adverse impact, of low magnitude, on the structure and function of the county value site will occur. This equates to a **minor adverse effect**, which is **not significant** in the short term, decreasing to a **negligible adverse effect** when vegetation reaches maturity in the long term.		These measures will reduce the impact of the loss of connecting ecological corridors and enhance the woodland itself; however, given the time required for habitats to establish to a level at which they provide an equivalent biodiversity resource to that lost (5-15 years), and time for enhancements to become successful (10-12) a temporary adverse impact, of low magnitude, on the structure and function of the county value site. This equates to a **minor adverse effect** in the short term, which is **not significant**, leading to a **negligible effect** in the long term which is **not significant**.
Assessment Phase 2b Winch Hill Wood – slight further habitat isolation, maturation of previous habitat		Very Low	Medium	Potential hydrological impacts are mitigated through the drainage strategy**,** refer to **Chapter 20** of this ES **[TR020001/APP/5.01]**. Indirect effects from dust, noise and pollution mitigated through the measures within the CoCP. Slight additional isolation through connecting habitat loss, however by this		

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
creation areas, and new area created. Indirect effects from dust, noise and pollution. Changes to hydrological conditions.				assessment Phase, the earlier habitat creation measures will have matured, and new areas further mitigate the loss of connectivity. With implementation of new habitat creation measures and maturation of previous, where removed adjacent land from intensive agriculture, this is reduced to **minor adverse effect,** which is **not significant** in the short term, decreasing to a **negligible adverse effect** when vegetation enhancements are successful in the long term (within 10-12 years).		
Dairyborn Scarp DWS						
Assessment Phase 1 Indirect impacts through construction related dust deposition, pollution events.	Implementation of measures within the CoCP (**Appendix 4.2** of this ES **[TR020001/APP/5.02]**).	Very Low	Medium	Indirect impacts could occur through construction related dust deposition, and pollution events for works including Off-site Highways Interventions and new roads, such as the AAR, A505 and also car park P3. Construction related dust, pollution events, controlled through implementation of CoCP will reduce this temporary adverse impact, of low magnitude, on the structure and function of the district value site will to a **minor adverse** effect, which is **not significant**.	N/A	M**inor adverse effect** level that is **not significant**.
Assessment Phase 2a Loss of c.1.3ha (20%) of Dairyborn Scarp DWS for AAR and associated works.	Replacement habitat creation within the DWS itself, and habitat creation areas east of the scheme, comprising the management of 0.5ha of existing woodland, the planting of 0.15ha of native scrub, the seeding of 1.1ha of neutral meadow grassland and the creation of 650m² of exposed chalk on lower-lying shallow slope	Medium	Medium	The partial loss of the key habitats of Dairyborn Scarp DWS for creation of the AAR and associated works represents a temporary adverse impact, of medium magnitude, on the structure and function of the district value site. This includes small scale trimming back of overhanging vegetation of a woodland that may lean towards being ancient woodland but is not on the AW inventory and not sufficient to qualify the DWS for AW. This equates to a **moderate adverse** effect in the short term, which is **significant** decreasing to a **minor adverse effect** with embedded mitigation, when vegetation reaches maturity within 5-15 years which is **not significant**.	Additional land for habitat creation where required as part of the biodiversity net gain strategy (**Appendix 8.5** of this ES **[TR020001/APP/5.02]**) for the project as shown in **Figures 14.11 to 14.13** of this ES **[TR020001/APP/5.03]**.	These measures will reduce the impact of the loss of habitats; however, given the time required for habitats to establish to a level at which they provide an equivalent biodiversity resource to that lost. Temporary **minor adverse** residual effect while replacement habitats establish, reducing to a **negligible** effect following maturation after 5-15 years within the DWS and the habitat creation areas.

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
						Negligible effect, not significant
Assessment Phase 2b Indirect impacts through construction related dust deposition, pollution events for AAR.	Implementation of measures within the CoCP (**Appendix 4.2** of this ES **[TR020001/APP/5.02]**).	Very Low	Medium	Construction related dust, pollution events, controlled through implementation of CoCP will reduce this temporary adverse impact, of very low magnitude, on the structure and function of the district value site to a **minor adverse effect** level that is **not significant**.	N/A	**Minor adverse effect,** which is **not significant**.
Luton Parkway Verges DWS						
Assessment Phase 1 Indirect impacts through construction related dust deposition, pollution events.	Implementation of measures within the CoCP (**Appendix 4.2** of this ES **[TR020001/APP/5.02]**).	Very low	Medium	Construction related dust, pollution events, degradation of water quality or change to water flows for works related to the A1081 Gipsy Lane and AAR, will be controlled through implementation of CoCP which will reduce this temporary adverse impact, of very low magnitude, on the structure and function of the district value site, to a **minor adverse effect** level that is **not significant**.	N/A	**Minor adverse effect** level that is **not significant**.
Assessment Phase 2a Indirect impacts to remaining areas, and loss of verge within the Proposed Development (0.21ha, 37%) during construction of P1 car park (unless can be avoided during detailed design).	Implementation of measures within the CoCP (**Appendix 4.2** of this ES **[TR020001/APP/5.02]**). Embedded mitigation within provision of open space and landscape restoration areas.	Medium	Medium	The partial loss of habitats (although primarily scrub (0.18ha) which is not the reason for the designation) of Luton Parkway Verges DWS for creation of the P1 car park represents a permanent adverse impact, of medium magnitude, on the structure and function of the district value site. This equates to a **moderate adverse** effect, which is **significant** decreasing to a **minor adverse effect** with embedded mitigation, when vegetation reaches maturity within 5-10 years which is **not significant**. The embedded mitigation includes large areas of neutral grassland (with calcareous grassland in assessment Phase 2b) which will be managed for 50 years, replacing a small section of largely scrubbed over grassland verges, which will be retained and managed if detailed design permits. Construction related dust, pollution events, degradation of water quality or change to water flows for works related to car park P1 will be controlled through implementation of CoCP will reduce this	Additional land for habitat creation where required as part of the biodiversity net gain strategy (**Appendix 8.5** of this ES **[TR020001/APP/5.02]**) for the project as shown in **Figures 14.11 to 14.13** of this ES **[TR020001/APP/5.03]**.	**Minor adverse effect,** which is **not significant** as the habitat will be created away from the DWS unless areas can be retained and managed within the Order Limits following detailed design.

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
				temporary adverse impact, of very low magnitude, on the structure and function of the district value site to a **minor adverse effect** that is **not significant**.		
Assessment Phase 2b - No additional construction impacts on Luton Parkway Verges DWS during assessment Phase 2b of the Proposed Development as works within this area will be completed in prior assessment phases.						
River Lea DWS/CWS and Luton Hoo Park CWS						
Assessment Phase 1 Indirect effects upon the River Lea and connected watercourses, and the River Lea DWS/CWS and Luton Hoo Park CWS.	Pollution control measures described in and secured through the CoCP (**Appendix 4.2** of this ES **[TR020001/APP/5.02]**) including runoff from highways works to avoid impacts to the River Lea and Wildlife Sites.	Low	Medium	Off-site Highway Intervention work crossing the River Lea and Wildlife Sites will not directly affect the watercourse or the adjacent habitats. With the implementation of pollution control measures there will be no significant effect on the River Lea and associated watercourses or adjacent habitats. A temporary effect of low magnitude on county value sites resulting in a **minor adverse effect**, which is **not significant.**	None required	**Minor adverse effect**, which is **not significant.**
Assessment Phase 2a Indirect impacts the River Lea and connected watercourses, and the River Lea DWS/CWS and Luton Hoo Park CWS.	Pollution control measures described in and secured through the CoCP (**Appendix 4.2** of this ES **[TR020001/APP/5.02]**) including runoff from construction of P1 car park to avoid impacts to the River Lea and Wildlife Sites.	Low	Medium	Construction of P1 car park occurs near to the River Lea and Wildlife Sites but will not directly affect the watercourse or the adjacent habitats. With the implementation of pollution control measures there will be no significant effect on the River Lea and associated watercourses or adjacent habitats. A temporary effect of low magnitude on county value sites resulting in a **minor adverse effect**, which is **not significant.**	None required	**Minor adverse effect**, which is **not significant.**
Assessment Phase 2b	No direct or indirect effects upon the River Lea or the River Lea DWS/CWS and Luton Hoo Park CWS are anticipated as a result of construction in assessment Phases 2b of the Proposed Development.					
Habitats						
All habitats						
All assessment phases - Indirect impacts on retained and created habitats, resulting from dust, pollution or hydrology.	Implementation of measures within the CoCP (**Appendix 4.2** of this ES **[TR020001/APP/5.02]**).	Very low	Medium to Very low	Construction related dust, pollution events, degradation of water quality or change to water flows during construction for all retained and created habitats. Embedded and good practice mitigation within the CoCP will reduce this temporary adverse impact to a very low magnitude, on the county to local value habitats, resulting in a **minor** to **negligible adverse effect** that is **not significant**.	N/A	**Minor** to **negligible adverse effect** that is **not significant.**
Broadleaved semi-natural woodland						

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
Assessment Phase 1 Loss of approx. 0.03ha of broadleaved semi-natural woodland (0.001ha within Wigmore Park CWS).	Approximately 6ha of woodland habitat creation has been included within the area of provision of open space in assessment Phase 1, as well as a further retained 5.14ha of existing woodland, of which 1.74ha will be managed. Additional retained areas will be managed including 0.5ha within Dairyborn Scarp DWS, 1.9ha of Winch Hill Wood CWS/LWS Ancient Woodland and 2.39ha within the landscape restoration areas, along with planting of 2.31ha of woodland habitat as part of the landscape restoration for the Proposed Development.	Low	Medium	Loss of approximately 0.03ha of broadleaved semi-natural woodland, to works through site clearance and temporary surface car parks. Woodland with the provision of open space is retained. This temporary adverse impact, of low magnitude, on the district value habitat, equates to a **minor adverse effect** level that is **not significant**. Embedded mitigation will reduce this to a **negligible effect** over time (10-30 years) following establishment of replacement habitat, which is **not significant**.	A further 4.37ha of additional broadleaved woodland will be created to the east of the Proposed Development as mitigation/ enhancement. In addition, approximately 0.66ha of a further 1.08ha of retained woodland would be managed to enhance biodiversity.	Temporary **negligible** residual effect while habitats establish, rising to a **minor beneficial** effect after 10-30 years within the open space and the habitat creation areas**, not significant**.
Assessment Phase 2a Loss of approx. 1.53ha of broadleaved semi-natural woodland (1.3ha within the last of Wigmore Park CWS, and a small area 0.09ha in Dairyborn Scarp DWS).		Medium	Medium (including HoPI)	Loss of approximately 1.53ha of broadleaved semi-natural woodland, to works including car parks P8 and 11. Woodland with the provision of open space is retained. This temporary adverse impact, of medium magnitude, on the district value habitat, equates to a **moderate adverse effect** level that is **significant**. Embedded mitigation will reduce this to a **minor adverse effect**, which is **not significant** over time (10-30 years) following establishment of replacement habitat however by assessment Phase 2a this will have already begun to mature.		Temporary **negligible** residual effect while habitats establish, rising to a **minor beneficial** effect after 10-30 years for assessment Phase 2a planting, assessment Phase 1 planting will already be maturing by assessment Phase 2a**, not significant**.
Assessment Phase 2b Loss of approx. 0.44ha of broadleaved semi-natural woodland (including the remaining linear line/double hedgerow of Wigmore Park CWS that connected to Winch Hill wood).		Very Low (due to small area and early stages of maturation of assessment Phase 1 and 2a woodland planting by this point).	Medium	Loss of approximately 0.44ha of broadleaved semi-natural woodland. Embedded mitigation including from assessment Phase 1, will reduce this temporary adverse impact, of very low magnitude, on the district value habitat, to a **minor adverse effect** level that is **not significant**. This will reduce to a **negligible effect**, which is **not significant** over time 10-30 years) following establishment of replacement habitat however by assessment Phase 2b this will have already begun to mature.		Temporary **negligible** residual effect while habitats establish, rising to a **minor beneficial** effect after 10-30 years for assessment Phase 2b planting, assessment Phase 1 and 2a planting will already be maturing by assessment Phase 2b**, not significant**.
Broadleaved plantation woodland						

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
Assessment Phase 1 Loss of approx. 0.62ha of broadleaved plantation woodland (0.4ha within Wigmore Park CWS).	Approximately 6ha of woodland habitat creation has been included within the area of provision of open space, as well as a further retained 5.14ha of existing woodland of which 1.74ha will be managed. Additional retained areas will be managed including 0.5ha within Dairyborn Scarp DWS, 1.9ha of Winch Hill Wood CWS/LWS Ancient Woodland and 2.39ha within the landscape restoration areas, along with planting of 2.31ha of woodland habitat as part of the landscape restoration for the Proposed Development.	Low (due to small area)	Low	Loss of approximately 0.62ha of broadleaved plantation woodland, to works including temporary car parks P6 and 7. Woodland with the provision of open space is retained. This temporary adverse impact, of low magnitude, on the local value habitat, equates to a **minor adverse effect** level that is **not significant**. Embedded mitigation will reduce to a **negligible effect** over time (10-30 years) following establishment of replacement habitat, which is **not significant**.	An additional 4.37ha of broadleaved woodland will be created to the east of the Proposed Development as mitigation/enhancement. In addition, approximately 0.66ha of a further 1.08ha of retained woodland would be managed to enhance biodiversity.	Temporary **negligible** residual effect while habitats establish, rising to a **minor beneficial** effect after 10-30 years within the open space and the habitat creation areas**, not significant**.
Assessment Phase 2a Loss of approximately 1.25ha of broadleaved plantation woodland (including a small area 0.004ha in Dairyborn Scarp DWS).		Medium	Low	Loss of approximately 1.25ha of broadleaved plantation woodland, to works including car parks P9 and the AAR. Embedded mitigation including from assessment Phase 1 will reduce this temporary adverse impact, of medium magnitude, on the local value habitat, to a **minor adverse effect** level that is **not significant**. This will reduce to a **negligible effect**, which is **not significant** over time (10-30 years) following establishment of replacement habitat however by assessment Phase 2a this will have already begun to mature.		Temporary **negligible** residual effect while habitats establish, rising to a **minor beneficial** effect after 10-30 years within the open space and the habitat creation areas**, not significant**.
Assessment Phase 2b Loss of approx. 0.2ha of broadleaved plantation woodland.		Low (due to small area)	Low	Loss of approximately 0.2ha of broadleaved plantation woodland. Woodland with the provision of open space is retained. Embedded mitigation including from assessment Phase 1 and 2a will reduce this temporary adverse impact, of low magnitude, on the local value habitat, to a **minor adverse effect** level that is **not significant**. This will reduce to a **negligible effect**, which is **not significant** over time (10-30 years) following establishment of replacement habitat however by assessment Phase 2a this will have already begun to mature.		Temporary **negligible** residual effect while habitats establish, rising to a **minor beneficial** effect after 10-30 years within the open space and the habitat creation areas**, not significant**.
Scrub – dense and scattered						

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
Assessment Phase 1 Loss of approx. 3.68ha of dense scrub and 2.46ha of scattered scrub (5.5ha within Wigmore Park CWS).	Approximately 1.8ha of scrub habitat creation has been included within the area of Provision of open space, as well as 0.14ha within Dairyborn Scarp DWS.	Medium	Very Low	Loss of approximately 3.68ha of dense scrub and 2.46ha of scattered scrub, to works including temporary car parks P6 and 7. Temporary adverse impact, of medium magnitude, on the local value habitat, equates to a **minor adverse effect** level that is **not significant**. Embedded mitigation (including habitats of equal or higher value) will reduce this to a **negligible effect** over time (5-10 years) following establishment of replacement habitat, which is **not significant**.	Additional land for habitat creation where required as part of the biodiversity net gain strategy (**Appendix 8.5** of this ES **[TR020001/APP/5.02]**) for the project as shown in **Figures 14.11 to 14.13** of this ES **[TR020001/APP/5.03]**, provides mitigation of other habitats of equal or higher value.	Temporary **negligible** residual effect while habitats establish, rising to a **minor beneficial** effect after 5-10 years within the open space and the habitat creation areas**, not significant**.
Assessment Phase 2a Loss of approximately 2.5ha of dense scrub and 0.35ha of scattered scrub (including 1.5ha within Wigmore Park CWS, 0.53ha within Dairyborn Scarp DWS and 0.18ha in Luton Parkway Verges DWS).		Medium	Very Low	Loss of approximately 2.85ha of scrub, to works including car parks P9 and the AAR. Embedded mitigation (including habitats of equal or higher value) including from assessment Phase 1 will reduce this temporary adverse impact, of medium magnitude, on the local value habitat, to a **minor adverse effect** level that is **not significant**. This will reduce to a **negligible effect**, which is **not significant** over time (5-10 years) following establishment of replacement habitat however by assessment Phase 2a this will have already matured.		Temporary **negligible** residual effect while habitats establish, rising to a **minor beneficial** effect after 5-10 years within the open space and the habitat creation areas**, not significant**.
Assessment Phase 2b Loss of approximately 0.52ha of dense scrub and 0.043ha of scattered scrub.		Low (due to small area)	Very Low	Loss of approximately 0.56ha of scrub. Embedded mitigation including from assessment Phase 1 and 2a will reduce this temporary adverse impact, of low magnitude, on the local value habitat, to a **negligible effect**, which is **not significant** over time following establishment of replacement habitat however by assessment Phase 2b this will have already matured.		Temporary **negligible** residual effect while habitats establish, rising to a **minor beneficial** effect after 5-10 years within the open space and the habitat creation areas**, not significant**.
Neutral semi-improved grassland						
Assessment Phase 1 Loss of approx. 4.2ha of neutral semi-improved grassland including 3ha	Approximately 21.9ha of neutral grassland habitat creation has been included within the area of Provision of open space, as well as 1.06ha of neutral meadow	Medium	Low	Loss of approximately 4.2ha of neutral semi-improved grassland, to works including temporary car parks P6 and 7. This temporary adverse impact, of medium magnitude, on the district value habitat, equates to a **minor adverse effect** level that is **not significant**. Embedded	A further 27.7ha of neutral grassland (meadow and low intensity grazing) created as mitigation/enhancement within the Habitat Creation Area in assessment Phase 1 (comprising 16.14ha of low	Temporary **negligible** residual effect while habitats establish, rising to a **minor beneficial** effect after 10 years within the open space

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
from within Wigmore Park CWS and 0.53ha at Junction 10 M1 Off-site Highway Improvements.	grassland within Dairyborn Scarp DWS, and 3.72ha as part of the Landscape Restoration works.			mitigation will reduce to a **negligible effect** over time (10 years) following establishment of replacement habitat, which is **not significant**.	intensity grazed grassland, and 11.55ha of neutral meadow grassland), along with a further 11.63ha of almost all low intensity grazed meadow in assessment Phase 2a.	and the habitat creation areas**, not significant**.
Assessment Phase 2a Loss of approx. 28.4ha of neutral semi-improved grassland.		Medium	Low	Loss of approximately 28.4ha of neutral semi-improved grassland, to works including car parks, fuel storage and water treatment facilities, earthworks and the AAR. The majority of this (27.7ha) includes previously arable fields now sown and managed to develop into neutral grassland. Embedded mitigation including from assessment Phase 1 will reduce this temporary adverse impact, of medium magnitude, on the local value habitat, to a **minor adverse effect** level that is **not significant**. This will reduce to a **negligible effect**, which is **not significant** over time (10 years) following establishment of replacement habitat however by assessment Phase 2a this will have already matured.		Temporary **negligible** residual effect while habitats establish, rising to a **minor beneficial** effect after 10 years within the open space and the habitat creation areas**, not significant**.
Assessment Phase 2b Loss of approx. 0.66ha of neutral semi-improved		Low (due to small area)	Low	Loss of approximately 0.66ha of neutral semi-improved grassland. Embedded mitigation including from assessment Phase 1 and 2a will reduce this temporary adverse impact, of low magnitude, on the local value habitat, to a **minor adverse effect** level that is **not significant**, reducing to a **negligible effect** over time following establishment of replacement habitat however by assessment Phase 2b this will have already matured, which is **not significant**.		Temporary **negligible** residual effect while habitats establish, rising to a **minor beneficial** effect after 10 years within the open space and the habitat creation areas**, not significant.**
Calcareous grassland						
Assessment Phase 1 Loss of approx. 0.08ha of calcareous grassland	None will be provided in the provision of open space in assessment Phase 1, however 650m^2 of exposed chalk will be created within Dairyborn	Very low (due to very small area)	Medium	Loss of approx. 0.08ha of calcareous grassland (0.06ha from within Wigmore Park CWS), to works including temporary car park P6. This permanent adverse impact, of low magnitude, on the district value habitat,	None proposed	**Minor adverse effect** level that is **not significant.**

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
	Scarp DWS in assessment Phase 2a, and 12.83ha will be provided as part of the Landscape Restoration in assessment Phase 2b.			equates to a **minor adverse effect** level that is **not significant**.		
Assessment Phase 2a Loss of approx. 0.3ha of calcareous grassland		Low (due to small area)	Medium	Loss of approx. 0.3ha of calcareous grassland, to works including car parks, earthworks and the AAR. This temporary adverse impact, of low magnitude, on the district value habitat, equates to a **minor adverse effect** level that is **not significant** in the short term. This will change to a **negligible** effect, which is **not significant** in the medium term once replacement habitat is provided as part of assessment Phase 2b, rising to a **minor beneficial** effect, which is **not significant** when habitats establish after 10-20 years, due to the large increase in area overall.	No additional areas provided.	M**inor adverse** residual effect that is **not significant** in the short term. N**egligible** effect, which is **not significant** in the medium term once replacement habitat is provided as part of assessment Phase 2b, rising to a **minor beneficial** effect, which is **not significant** when habitats establish after 10-20 years, due to the large increase in area overall.
Assessment Phase 2b - There will be no additional loss of calcareous grassland lost to the Main application works.						
Poor semi-improved grassland						
Assessment Phase 1 Loss of approx. 6.5ha of poor semi-improved grassland	Approximately 21.9ha of neutral grassland habitat creation has been included within the area of provision of open space, which is intended to be managed as grassland of higher value than poor semi-improved grassland, as well as 1.06ha of neutral meadow grassland within Dairyborn Scarp DWS, and 3.72ha as part of the Landscape Restoration works	Medium	Very Low	Loss of approx. 6.5ha of poor semi-improved grassland (1.6ha from within Wigmore Park CWS), to works including temporary car park P6. Embedded mitigation includes for the creation of higher value grassland habitats in place of the loss of this habitat type. This temporary adverse impact, of low magnitude, on the local value habitat, equates to a **minor adverse effect** level that is **not significant** in the short term. Embedded mitigation which provides a replacement of higher value than poor semi improved grassland, will reduce to a **negligible effect** over time (10 years) following establishment of replacement higher value habitat, which is **not significant**.	A further 27.7ha of higher value than semi-improved grassland created as mitigation/ enhancement within the Habitat Creation Area in assessment Phase 1 (comprising 16.14ha of low intensity grazed grassland, and 11.55ha of neutral meadow grassland), along with a further 11.63ha of almost all low intensity grazed meadow in assessment Phase 2a.	With habitat creation, this **negligible** residual effect while habitats establish, rises to a **minor beneficial** effect after 10 years within the habitat creation areas**,** which is **not significant.**
Assessment Phase 2a Loss of approx. 14ha of poor semi-improved grassland		Medium	Very Low	Loss of approx. 14ha of poor semi-improved grassland, to works including car parks, earthworks and the AAR. This temporary adverse impact, of low magnitude, on the local value habitat, equates to a **minor adverse effect** level that is **not significant** in the short term. Embedded mitigation including within assessment Phase 1 which provides a		With habitat creation, this **negligible** residual effect while habitats establish, rises to a **minor beneficial** effect after 10 years within the habitat creation areas, which is **not significant.**

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
				replacement of higher value than poor semi improved grassland, will reduce to a **negligible effect**, which is **not significant** over time (10 years) following establishment of replacement habitat however by assessment Phase 2a this will have already matured.		
Assessment Phase 2b Loss of approx. 4.1ha of poor semi-improved grassland		Low (due to small area)	Very Low	Loss of approximately 4.1ha of poor semi-improved grassland. This temporary adverse impact, of low magnitude, on the local value habitat, equates to a **minor adverse effect** level that is **not significant** in the short term. Embedded mitigation including within assessment Phase 1 and 2a which provides a replacement of higher value than poor semi-improved grassland, will reduce to a **negligible effect**, which is **not significant** over time (10 years) following establishment of replacement habitat however by assessment Phase 2b this will have already matured		Temporary **negligible** residual effect while habitats establish, rising to a **minor beneficial** effect, after 10 years, and habitat creation from previous assessment phases within the habitat creation areas, which is **not significant.**
Arable (including field margins and arable plants)						
Assessment Phase 1 Loss of approx. 0.63ha of arable land potentially inc. arable field margins and their associated arable plants	Retention of arable margins along retained woodland belts and hedgerows where possible. Implementation of suitable management regime of retained and created habitats to encourage establishment of notable arable plant species through Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**).	Low (due to small area)	Low	Loss of approx. 0.63ha of arable land with associated field margins and plants, to works including temporary car parks. This permanent adverse impact, of low magnitude, on the district value habitat, equates to a **minor adverse effect** that is **not significant**.	The habitat creation areas will include neutral grassland habitat creation. These habitats will be managed with a low input, low intensity regime, with appropriate management of field margins and bare ground on bunds, to encourage the establishment of those arable plant species lost to construction of the Proposed Development.	With habitat creation, this residual **minor adverse** effect while habitats establish, reduces to a **negligible** effect after 5-10 years within the habitat creation areas, which is **not significant.**
Assessment Phase 2a Loss of approx. 12.9ha of arable land potentially inc. arable field margins and their associated arable plants	Retention of arable margins along retained woodland belts and hedgerows where possible. Implementation of suitable management regime of retained and created habitats to encourage establishment of notable arable plant species through Outline	Medium	Low	Loss of approx. 12.9ha of arable land with associated field margins and plants, to landscape restoration, earthworks, fuel pipeline and fuel storage and water treatment facilities. This permanent adverse impact, of low magnitude, on the district value habitat, equates to a **minor adverse effect** that is **not significant**.		With habitat creation, this residual **minor adverse** effect while habitats establish, reduces to a **negligible** effect after 5-10 years within the habitat creation areas, which is **not significant.**

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
	LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**).					
Assessment Phase 2b – No further arable land will be lost to the Main application works.						
Ancient and veteran trees						
All assessment phases - Damage/loss of potential future veteran trees	Avoidance and retention has been included within the design where possible. Any felled deadwood will be retained in the landscape design. Tree protection measures are described with the CoCP (**Appendix 4.2** of this ES **[TR020001/APP/5.02]**).	Low	Medium (not actual veterans – just future potential veterans)	Nine ancient and veteran trees and a small group of five ancient and veteran trees have been identified have been retained within the Main Application Site through arboricultural surveys. These trees will be retained and have been incorporated into the landscape design for the provision of open space and habitat creation areas with the exception of one, (T343 – coppiced ash (**Appendix 14.2** and **14.3** of this ES **[TR020001/APP/5.02]**)) which lies directly within the main works but will be coppiced and translocated. Further future potential ancient and veteran trees, but not currently classed as such, would be lost. Ancient and veteran trees are irreplaceable therefore the potential damage of potential future veteran trees to the construction of the Proposed Development will result in a permanent adverse impact, of low magnitude with embedded mitigation providing protection, on these district (as potential future and not actual veteran trees) value receptors. This equates to a residual **minor adverse** effect, which is **not significant**.	Tree 343 will be re-coppiced and translocated in order to retain the tree (**Chapter 14**, of this ES **[TR020001/APP/5.01]**) although it is acknowledged that the success of translocation cannot always be guaranteed. Opportunities will be explored to contribute to veteran tree management off-site or 'veteranisation' of mature trees to replicate the beneficial features of veteran trees.	Replication of the value of veteran trees is not a guaranteed success nor is the translocation of a coppiced tree therefore a **minor adverse** residual effect will remain, which is **not significant**.
Species Rich Hedgerows						
Assessment Phase 1 Potential damage to retained hedgerows. No loss in this assessment Phase.	Avoidance and retention within design where possible. Creation or restoration of approximately 4.2km of mixed-species hedgerows with hedgerow trees included within landscape design as part of the provision of open space in assessment Phase 1. A further 650m will be created as part of Landscape Restoration in	Very low	Medium	Retained hedgerows within assessment Phase 1, could be indirectly affected where works fall within the RPZ of the hedgerows and their trees. Embedded mitigation including within the CoCP measures will ensure that these hedgerows are protected. This represents an adverse impact of very low magnitude on this district value receptor, resulting in a **minor adverse effect**, which is **not significant**.	Replacement of 4.2km and strengthening of over 6.5km of hedgerows within the wider landscape to restore hedgerow network and their ecological corridors.	Temporary **minor adverse** residual effect while replacement habitats establish, rising to a **minor beneficial** effect (due to large lengths of replacement and enhanced hedgerows), following maturation after 5-15 years, which is **not significant**.
Assessment Phase 2a Loss of c.240m section of		Low (relatively small length of ubiquitous	Medium	Assessment Phase 2a construction of the Proposed Development will result in the loss of an approximately c. 240m section of species-rich hedgerow, none of which		

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
species-rich hedgerow with trees (primarily double hedgerow so 120m in length).	assessment Phase 1 and creation or enhancement of 2.12km in assessment Phase 2b. The area proposed as the provision of open space is bordered by hedgerows, many of which are species-rich and qualify as important under the criteria outlined within the Hedgerows Regulations 1997 (Ref. 8.7). Indirect effects of earthworks within Root Protection Zones (RPZs) of retained hedgerows controlled though CoCP measures (**Appendix 4.2** of this ES **[TR020001/APP/5.02]**).	local habitat)		are Important under the Hedgerow Regulations (Ref. 8.7). Given the small length and isolated nature of section being lost this represents an adverse impact of low magnitude on this district value receptor, resulting in a **minor adverse effect**, which is **not significant** decreasing to a **negligible effect** when vegetation reaches maturity within 5-15 years, which is **not significant**.		
Assessment Phase 2b Loss of c.756m section of species-rich hedgerow with trees (primarily double hedgerow so 378m in length).		Low (relatively small length of ubiquitous local habitat)	Medium	As per assessment Phase 2a		
Ponds						
Assessment Phase 1 Loss of one pond (Pond 12).	None proposed in the provision of open space	Low	Low	Loss of one pond (Pond 12) in assessment Phase 1 to car parks P6 and P7. This represents a low adverse effect at the local level which equates to a **minor effect,** which is **not significant**.	Bird strike risk restricts creation of large ponds within the Proposed Development however a cluster of small wildlife ponds are proposed in the Habitat Creation Area, east of the Proposed Development.	With habitat creation in assessment Phase 1, by assessment Phase 2a and 2b there will be a net loss of ponds, however the majority of the lost ponds are soakaways and fire training pools of limited biodiversity value, and those created and managed will be wildlife ponds. Therefore there will be a residual **negligible** effect for assessment Phase 2a onwards, which is **not significant**.
Assessment Phase 2a Loss of four ponds (Ponds 8, 13, 14, and 15).	None proposed in the provision of open space	Medium	Low	Loss of four ponds in assessment Phase 1 to new taxi way and isolation stands, new apron for stands taxi lanes and taxiways, car park P10. This represents a medium adverse effect at the local level which equates to a **minor effect,** which is **not significant**.		
Assessment Phase 2b – loss of two ponds (Pond 5 and 6)	None proposed in the provision of open space	Low	Low	Loss of two ponds (Pond 5 and 6) in assessment Phase 1 to car parks and embankments. This represents a low adverse effect at the local level which equates to a **minor effect,** which is **not significant**.		
Species						
Orchids						
Assessment Phase 1 Loss of populations of orchids	Retention of set-aside habitat within the provision of open space and additional replacement habitat	Medium (loss of majority of population)	Medium (due to low tolerance for change)	Assessment Phase 1 includes the loss of most of Wigmore Park CWS including the part of the populations of orchid. The orchids within the set-aside areas of the arable fields that will be used to create the	Translocation of orchids to appropriate location within the provision of open space, during appropriate season following best practice guidance and	Temporary **minor adverse residual** effect while replacement habitats and translocated orchids establish,

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
(common spotted, pyramidal, common twayblade and bee orchid).	included within landscape design. However, the embedded mitigation which forms part of assessment phases 1, 2a and 2b construction includes creation of neutral and calcareous grassland, and also bare chalk slopes, which are highly suitable for pyramidal and bee orchids, as detailed within the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**).			replacement Wigmore Park, will be retained and protected during the work, and long-term management will be implemented in this area to encourage long term viability of the orchid population in this area. A temporary adverse impact, of medium magnitude, will occur on this district value population, resulting in a **moderate adverse effect**, which is **significant** decreasing to a **minor effect** when managed retained areas of orchid populations in the provision of open space, reaches maturity within 5-10 years, which is **not significant**.	detailed within the Outline LBMP. Receptor sites to be prepared in advance of translocation to increase chances of long-term success.	decreasing to **a negligible effect** following maturation after 5-10 years of suitable management.
Assessment Phase 2a Loss of populations of orchids (common spotted, pyramidal, common twayblade and bee orchid).		Medium (partial loss of population)	Medium (due to low tolerance for change)	The assessment Phase 2a construction of the Proposed Development will result in the loss of the remaining area of Wigmore Park CWS (that not lost during assessment Phase 1), including the remaining populations of common spotted orchid, pyramidal orchid, bee orchid and common twayblade and any present within the area of Luton Parkway Verges DWS lost. A temporary adverse impact, of medium magnitude, will occur on this district value population, resulting in a **moderate adverse effect**, which is **significant** decreasing to a **minor effect** when managed retained areas of orchid populations in the provision of open space reaches maturity within 5-10 years, which is **not significant**.		
Assessment Phase 2b works - No additional impact. Wigmore Park CWS no longer exists by assessment Phase 2b of the Proposed Development.						
Japanese knotweed						
Assessment Phase 1 Risk of the spread of Schedule 9 (Ref. 8.10) invasive species - Japanese Knotweed.	Japanese knotweed management protocols required to eradicate this invasive species and ensure no spread because of the construction works. Restriction of working areas to avoid spread of Schedule 9 invasive	Very Low	Very Low	A large stand of Japanese knotweed is located within woodland immediately adjacent to the east of the assessment Phase 1 works at Wigmore Park. Specialist treatment / removal required as explained within the CoCP. The equates to a permanent impact, of very low magnitude, on this species which would result in a **negligible effect,** however eradication of this invasive	None required.	**Minor beneficial effect,** that is **not significant**

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
	species or specialist treatment/removal required as detailed within the CoCP (**Appendix 4.2** of this ES **[TR020001/APP/5.02]**).			species form the site would be a **minor beneficial effect** which is **not significant**.		
Assessment Phase 2a Risk of the spread of Schedule 9 invasive species - Japanese Knotweed.		Very Low	Very Low	A large stand of Japanese knotweed is located within the broadleaved woodland at Wigmore Park that will be lost to assessment Phase 2a construction works of the Proposed Development. Specialist treatment / removal required as explained within the CoCP. The equates to a permanent impact, of very low magnitude, on this species which would result in a **negligible effect**, however eradication of this invasive species form the site would be a **minor beneficial effect** which is **not significant**.	None required.	**Minor beneficial effect,** that is **not significant**
Assessment Phase 2b - No additional impact. Wigmore Park CWS no longer exists by assessment Phase 2b of the Proposed Development and it is anticipated that this species and other INNS will have been eradicated by assessment Phase 2b.						
Badger						
Assessment Phase 1 Loss of badger territory including four outlier setts (two active, two disused) and associated habitats and disturbance of retained setts.	Habitat creation to provide replacement foraging, dispersal and sett building opportunities. Appropriate fencing of construction areas and provision of exit routes from excavation, as detailed in the CoCP **(Appendix 4.2** of this ES **[TR020001/APP/5.02]**).	Medium (loss of multiple setts but no active main sett)	Low	The assessment Phase 1 works for the Proposed Development will result in the loss of at least four outlier setts (two active, two disused) for works including car park creation, as well as grassland, scrub, hedgerow and woodland habitats that offer a foraging resource and form part of the territories for at least two badger groups. In addition, landscape and habitat creation works will affect/disturb four main setts (one now disused) and their associated outlier/annexe/subsidiary setts and partial territories, but it is assumed they can be retained. With embedded mitigation for retention and replacement of habitats, a temporary adverse impact, of medium magnitude, will occur on these local value populations resulting **Minor adverse effect** which is **not significant** in the short term, and **negligible** which is **not significant** in the long term once the habitats have matured (5-15 years).	Closure and disturbance of setts will be secured in advance under a development licence from Natural England with associated method statements. An artificial sett is not currently required but would be created for any active main sett lost to the Proposed Development if circumstances change (to be confirmed through pre-construction surveys and detailed design), within land owned by the client, and within the territory of the badger social groups concerned (Badger Mitigation Strategy, **Appendix 8.7**of this ES **[TR020001/APP/5.02]**). Off-site strengthening of 'green corridors' in the form of hedgerows will provide connections to off-site foraging opportunities.	Temporary **minor adverse** residual effect while replacement habitats establish (5-15 years), rising to **negligible** in the long term, which is **not significant**
Assessment Phase 2a Loss of badger territory including potentially a disused main	Habitat creation to provide replacement foraging, dispersal and sett building opportunities. Appropriate fencing of construction areas and	Medium (loss of multiple setts but no active main sett)	Low	The assessment phase 2a construction may result in the potential loss of one disused main badger sett to earthworks and creation of the fuel facility and water treatment facility but there may be sufficient space to retain it depending upon detailed design. There will also be		Temporary **minor adverse** residual effect while replacement habitats establish (5-15 years), and the replacement sett (if needed) becomes used,

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
sett, loss of three subsidiaries (one disused), and loss/disturbance to multiple outlier and associated habitats and disturbance of retained setts.	provision of exit routes from excavation, as detailed in the CoCP **(Appendix 4.2** of this ES **[TR020001/APP/5.02]**).			disturbance to one other main badger sett and loss of three subsidiaries, and loss/disturbance to multiple outliers due to the main works and fuel pipeline installation, as well as loss of habitats. With embedded mitigation for retention and replacement of habitats, a temporary adverse impact for loss of habitat, of medium magnitude, will occur on these local value populations resulting in a **minor adverse effect** which is **not significant** in the **short term,** and **negligible effect** which is **not significant** in the long term once the habitats have matured (5-15 years).		decreasing to **negligible** in the long term, which is **not significant.**
Assessment Phase 2b Loss of badger territory and associated habitats and disturbance of retained setts.	Habitat creation to provide replacement foraging, dispersal and sett building opportunities. Appropriate fencing of construction areas and provision of exit routes from excavation, as detailed in the CoCP **(Appendix 4.2** of this ES **[TR020001/APP/5.02]**).	Low (disturbance and loss of territory, but no loss of setts)	Low	The assessment phase 2b construction will result in further disturbance of badger setts during works and habitat creation, landscape restoration. A temporary adverse impact, of low magnitude, will occur on these local value populations resulting in a **negligible effect**, which is **not significant.**		Temporary **negligible** residual effect, earlier assessment phases habitat creation will have matured (5-15 years), leading to **minor beneficial effect** in the long term, which is **not significant.**
Bats - Habitats						
Assessment Phase 1 Bats – loss and disturbance of foraging habitats.	Replacement habitat creation within landscape design of the provision of open space and landscape restoration areas. Implementation of measures to reduce noise and light pollution, as described in the CoCP **(Appendix 4.2** of this ES **[TR020001/APP/5.02]**).	Medium	Medium (due to important invertebrate prey at Wigmore Park)	Assessment Phase 1 will result in the loss of grassland, scrub, waterbodies and woodland habitats at Wigmore Park that are utilised by foraging bats. The loss of foraging habitats to the assessment Phase 1 works for the Proposed Development, therefore, represents a temporary adverse impact, of medium magnitude, on this district value bat assemblage which would result in a **moderate adverse effect**, which is **significant** decreasing to a **minor effect** when vegetation reaches maturity within 10-12 years, which is **not significant**. Construction disturbance and lighting could also affect the bat assemblage using the site. Following the implementation of embedded measures to reduce noise and light pollution, as described in the CoCP, there will be a temporary adverse impact, of low magnitude, on the local bat	Habitat Creation Areas and off-site strengthening of ‘green corridors’ in the form of hedgerows to connect off-site foraging opportunities. Additional mitigation including cowls in appropriate areas will further reduce light spill.	Taking into account the increased connectivity of the habitats within the wider area as a result of the off-site planting, there will be a temporary **minor adverse effect** while replacement habitats establish, decreasing to a **negligible effect** in the long term, which is **not significant.**

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
				assemblage resulting in a **minor** adverse effect, which is **not significant** for all assessment phases.		
Assessment Phase 2a Bats – loss and disturbance of foraging habitats.		Medium (well used commuting route loss as well as large areas of habitat)	Medium	The assessment phase 2a construction will result in the loss of grassland, hedgerow, scrub, waterbodies and woodland habitats that are utilised by foraging and commuting bats. It will also result in some severance of the well-used bat commuting routes that have been identified along the boundary of Wigmore Park and connecting Wigmore Park to the Winch Hill Wood ancient woodland. A temporary adverse impact, of medium magnitude, will occur on this district value bat assemblage resulting in a **moderate adverse effect**, which is **significant** decreasing to a **minor effect** when vegetation reaches maturity within 10-12 years, which is **not significant**.		
Assessment Phase 2b Bats – loss and disturbance of foraging habitats.		Low (affects areas close to or within the airport and habitats already affected in earlier assessment phases).	Medium	Assessment Phase 2b affects areas within and around the existing and new areas of the airport, comprising mostly habitats already affected. Embedded habitat mitigation measures, some of which will have matured by this point, reduce this from moderate adverse to **minor adverse effect** which is **not significant** decreasing to a **negligible effect** when vegetation reaches maturity within 10-12 years.		
Bats - roosts						
Assessment Phase 1 Disturbance to roosts.	Implementation of measures to reduce noise and light pollution, as described in the CoCP (**Appendix 4.2** of this ES **[TR020001/APP/5.02]**).	Low	Low (small local value roosts of common and widespread species)	Single common pipistrelle summer day roosts were identified within a cottage at Winch Hill, tree T126 (**Figure 8.3** of this ES **[TR020001/APP/5.03]**) within nearby woodland, and the Pillbox. Each roost is surrounded on three sides or adjacent to the land required for the provision of open space within the assessment Phase 1 works. Construction works associated with the assessment Phase 1 works have the potential to introduce disturbance, through construction related noise, lighting and vibration, to roosts of local value within	Loss and disturbance of bat roosts will be done under a protected species mitigation licence from Natural England with associated method statements being implemented in full and agreed in advance. Provision of artificial roosting opportunities on retained trees and buildings within the Proposed Development prior to the works, within land owned by the client (Bat Strategy,	Taking into account artificial roost replacement, and careful/licensed approach to roost removal, there will be a **negligible effect** which is **not significant.**

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
				retained buildings and trees adjacent to the Proposed Development. A temporary adverse impact, of low magnitude, will occur on these local value roosts resulting in a **minor adverse effect**, which is **not significant.**	**Appendix 8.8** of this ES **[TR020001/APP/5.02]**). Additional mitigation including cowls in appropriate areas will further reduce light spill.	
Assessment Phase 2a Disturbance to and loss of roosts.	Implementation of measures to reduce noise and light pollution, as described in the CoCP **(Appendix 4.2** of this ES **[TR020001/APP/5.02]**).	Low	Low (small local value roosts of common and widespread species)	Assessment Phase 2a would also result in the loss of one tree (T104) (**Figure 8.3** of this ES **[TR020001/APP/5.03]**) and disturbance of two trees (T120 and T124) that have been identified as supporting single common pipistrelle summer day roosts, and the retained building roost in the Pillbox, and one further tree roost (T126) within woodland at Winch Hill. Construction works associated with the assessment Phase 2b works have the potential to introduce disturbance, through construction related noise, lighting and vibration, to roosts of local value within retained buildings and trees adjacent to the Proposed Development. An adverse impact, of low magnitude, will occur on these local value roosts resulting in a **minor adverse effect**, which is **not significant.** This will be temporary for disturbance and a permanent impact for the loss of a roost.		Taking into account artificial roost replacement, and careful/licensed approach to roost removal, there will be a **negligible effect** which is **not significant.**
Assessment Phase 2b Disturbance to and loss of roosts.	Implementation of measures to reduce noise and light pollution, as described in the CoCP **(Appendix 4.2** of this ES **[TR020001/APP/5.02]**).	Low	Low (small local value roosts of common and widespread species)	The construction of assessment phase 2b of the Proposed Development will also result in the loss of two trees (T120 and T124) (**Figure 8.3** of this ES **[TR020001/APP/5.03]**) that have been identified as supporting single or small common pipistrelle summer day roosts, and further disturbance of a tree (T126) near to Winch Hill. An adverse impact, of low magnitude, will occur on these local value roosts resulting in a **minor adverse effect**, which is **not significant.** This will be temporary for disturbance and a permanent impact for the loss of a roost.		Taking into account artificial roost replacement, and careful/licensed approach to roost removal, there will be a **negligible effect** which is **not significant.**
Riparian mammals						
Assessment Phase 1 and 2a Indirect effects upon riparian mammals	Pollution control measures described in and secured through the CoCP **(Appendix 4.2** of this ES	Low	Medium	Off-site Highway Intervention work crossing the River Lea will not directly affect the watercourse. With the implementation of pollution control measures there will be no significant effect	None required	**Minor adverse effect**, which is **not significant.**

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
present on the River Lea and connected watercourses.	**[TR020001/APP/5.02]**) including runoff from Off-site Highway Intervention work to avoid impacts to the River Lea.			on the otter or water vole populations assumed to be using the River Lea and associated watercourses. A temporary effect of low magnitude on a district value species resulting in a **minor adverse effect**, which is **not significant.**		
Assessment Phase 2b	No direct or indirect effects upon the River Lea are anticipated as a result of construction of assessment phase 2b of the Proposed Development					
Other mammals						
Assessment Phase 1 Loss of habitat.	Replacement habitat within landscape design and landscape restoration areas.	Low	Very Low	Each assessment Phase of the works will result in the loss of habitats including arable, grassland, scrub, waterbodies and woodland. These habitats are likely to offer foraging, dispersal and shelter opportunities for a range of mammals, potentially including hedgehogs, brown hare and polecat. It is recognised that time is required for replacement habitat creation measures to establish to a level at which they provide an equivalent foraging resource to that lost, and each assessment Phase improves on the maturity of those habitats. The loss of habitats represents a temporary adverse impact, of low magnitude, on these local level receptors. Which equates to a **negligible effect** which is **not significant**, increasing to a **minor beneficial effect** when habitats have established within 10-12 years.	Additional habitat creation/ enhancement measures to the east of the Proposed developments including grassland, scrub and woodland habitats.	**Minor beneficial effect** which is **not significant**.
Assessment Phase 2a Loss of habitat.		Low	Very Low			**Minor beneficial effect** which is **not significant**.
Assessment Phase 2b Loss of habitat.		Low	Very Low			**Minor beneficial effect** which is **not significant**.
Breeding birds - nesting						
Assessment Phase 1 - Risk of damage/ disturbance to nesting birds.	Timing of vegetation clearance works to avoid bird nesting period (March – Aug inclusive). Nesting bird check where this is not possible. Noise and light pollution control measures. Captured within the CoCP (**Appendix 4.2** of this ES **[TR020001/APP/5.02]**).	Very low	Low	For all assessment Phases, the clearance of vegetation could cause the loss of nests or damage/disturbance to nests during construction of the Proposed Development. However, with embedded mitigation which reduces the likelihood of impacts to nesting birds, this represents a very low temporary adverse effect at the local level which equates to a **negligible effect,** which is **not significant**.	None required	**Negligible effect,** which is **not significant**
Assessment Phase 2a Risk of damage/ disturbance to nesting birds		Very low	Low		None required	**Negligible effect,** which is **not significant**
Assessment Phase 2b Risk of damage/ disturbance to nesting birds.		Very low	Low		None required	**Negligible effect,** which is **not significant**

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
Breeding birds – loss of habitat						
Assessment Phase 1 Loss of habitats.	Replacement habitat within landscape design and landscape restoration areas.	Medium	Low	For all assessment phases, the habitat creation measures included as part of the Proposed Development will reduce the impact of the loss of habitats used by nesting and foraging birds. However, it is recognised that time is required for replacement habitats to establish to a level at which they provide an equivalent resource to that loss, which will improve with each assessment Phase as the previous assessment Phase habitats mature. The loss of habitats used by nesting birds, as a result of the works for the Proposed Development, represents a temporary adverse impact, of medium magnitude, on this local value receptor. This equates to a **minor adverse effect**, decreasing to a **negligible effect** when habitats have established within 10-12 years, which is **not significant**.	Additional habitat creation/ enhancement measures to the east of the Proposed developments including grassland, scrub and woodland habitats. Nest box provision appropriate for species present on retained trees/ structures within the Habitat Creation Area e.g. tree sparrow boxes (Bird Mitigation Strategy, **Appendix 8.9** of this ES **[TR020001/APP/5.02]**).	Temporary **minor adverse** residual effect while replacement habitats establish, reducing to **negligible** in the long term, which is **not significant**.
Assessment Phase 2a Loss of habitats.		Medium	Low			
Assessment Phase 2b Loss of habitats.		Medium	Low			**Negligible effect** as less habitats lost, becoming **minor beneficial effect** in the long term, which is **not significant.**
Schedule 1 birds – Barn owl and Red kite - disturbance						
Assessment Phase 1 Risk of disturbance to Sch. 1 nesting birds.	Timing of vegetation clearance works to avoid bird nesting period (March – Aug inclusive). CoCP (**Appendix 4.2** of this ES **[TR020001/APP/5.02]**) contains requirement for ornithological watching brief to reduce the risk of disturbance to Schedule 1 species breeding in proximity to the Proposed Development. Noise and light pollution control measures also captured within the CoCP.	Low	Medium	For all assessment Phases, the clearance of vegetation could cause the loss of nests or damage/disturbance to nests of Schedule 1 birds during construction of the Proposed Development, as all areas include potential nest sites, however no known sites were identified within the main application site. However, embedded mitigation reduces the likelihood of impacts to schedule 1 nesting birds to a temporary low adverse effect at the county level which equates to a **minor adverse effect,** which is **not significant**.	None required	**Minor adverse effect,** which is **not significant**
Assessment Phase 2a Risk of disturbance to Sch. 1 nesting birds.		Low	Medium		None required	**Minor adverse effect,** which is **not significant**
Assessment Phase 2b Risk of disturbance to Sch. 1 nesting birds.		Low	Medium		None required	**Minor adverse effect,** which is **not significant**
Wintering birds - habitats						
Assessment Phase 1 Loss of habitats utilised for foraging / resting.	Replacement habitat within landscape design.	Medium	Low	Loss of habitats including arable and semi-improved grasslands that are used for foraging and shelter by an assemblage of over-wintering birds, including farmland birds such as linnet and skylark.	The habitat creation area to the east of the provision of open space will include neutral and calcareous grassland habitat creation. The outer areas (to avoid the runway and flight	Temporary **minor adverse residual effect** while replacement habitats establish, reducing to **negligible** in

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
Assessment Phase 2a Loss of habitats utilised for foraging / resting.	Replacement habitat within landscape design.	Medium	Low	The habitat creation measures will reduce the impact of the loss of habitats used by nesting and foraging birds. However, it is recognised that time is required for replacement habitats to establish to a level at which they provide an equivalent resource to that loss. The loss of habitats used by over-wintering birds to assessment Phase 1 construction of the Proposed Development represents a temporary adverse impact, of medium magnitude, on this district value receptor. This would result in a **minor adverse effect**, which is **not significant**.	lines) of these fields will be managed, in accordance with bird strike minimisation measures (Bird Strike Risk Assessment (**Appendix 8.4** of this ES **[TR020001/APP/5.02]**), to establish rough grassland strips to provide suitable cover and foraging for farmland bird species.	the long term which is **not significant**.
Assessment Phase 2b Loss of habitats utilised for foraging / resting.	Replacement habitat within landscape design.	Medium	Low			
Wintering birds - disturbance						
Assessment Phase 1 Risk of disturbance.	Noise and light pollution control measures. Captured within the CoCP (**Appendix 4.2** of this ES **[TR020001/APP/5.02]**).	Very low	Low	Noise, visual and light pollution generated by construction has the potential to disturb foraging and resting birds using adjacent habitats. This disturbance can result in birds expending additional energy to locate new foraging grounds, which can be detrimental to their ability to maintain sufficient energy to survive the winter. With the implementation of measures, as detailed within the CoCP to control noise and light pollution, the disturbance of habitats used by wintering birds as a result of the works represents a temporary adverse impact, of very low magnitude, on this district value receptor. This would equate to a **negligible effect**, which is **not significant**.	None required	**Negligible effect,** which is **not significant**
Assessment Phase 2a Risk of disturbance.		Very low	Low		None required	**Negligible effect,** which is **not significant**
Assessment Phase 2b Risk of disturbance.		Very low	Low		None required	**Negligible effect,** which is **not significant**
Schedule 1 birds – Barn owl and Red kite - loss of habitat						
Assessment Phase 1 Loss of foraging habitat.	Replacement foraging habitats within landscape design. These will be located away from the main flight path to avoid bird strike issues.	Low	Medium	Each assessment phase of works will result in the loss of woodland, grassland, arable margin and scrub habitats, which provide foraging opportunities for a local population of barn owl and red kite. No known nest sites are located within proximity to the land required for the works, and therefore it will not result in the loss of any known barn owl or red kite nest sites. Given the time required for replacement habitats to establish to a level at which they support an equivalent foraging resource, the loss of habitats remains a temporary adverse impact, of low magnitude, on these county value	Artificial roost provision a suitable distance from the airport (Bird Mitigation Strategy, **Appendix 8.9** of this ES **[TR020001/APP/5.02]**). Additional creation of grassland, hedgerows, arable margins and woodland providing alternative foraging and nesting opportunities for this species.	Temporary **minor adverse** residual while replacement habitats establish, reducing to **negligible** in the long term.
Assessment Phase 2a Loss of foraging habitat.		Low	Medium			
Assessment Phase 2b Loss of foraging habitat.		Low	Medium			**Negligible effect** as less habitats lost, becoming **minor beneficial effect** in the long term when previous assessment Phase habitat mitigation

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
				receptors. This would equate to a **minor adverse effect**, which is **not significant**, decreasing to a **negligible effect** when vegetation reaches maturity within 10-12 years, which is **not significant**.		matures, which is **not significant.**
Reptiles – risk of harm						
Assessment Phase 1 Risk of killing/injuring.	Supervised, staged clearance of habitats to displace reptiles within the construction site at an appropriate time of year (April – October), as detailed within the CoCP (**Appendix 4.2** of this ES **[TR020001/APP/5.02]**).	Low	Low	Assessment Phase 1 will result in the loss of grassland, scrub and waterbody habitats at Wigmore Park which are considered likely to provide foraging and shelter opportunities for grass snake (assumed to be present across the site). The works to establish the provision of open space have the potential to impact upon slow worm populations that have been identified in the north of this area (**Figure 8.3** of this ES **[TR020001/APP/5.03]**), through small scale habitat loss in these margins and the potential to kill or injure reptiles during clearance and habitat establishment. Embedded mitigation reduces this to a low adverse effect at the local level which equates to a **minor adverse effect,** which is **not significant**.	Translocation of slow worms (and grass snake if present) to suitable retained habitat during site clearance within the Main Application Site (Amphibian and Reptile Mitigation Strategy, **Appendix 8.6** of this ES **[TR020001/APP/5.02]**).	**Negligible effect,** which is **not significant**
Assessment Phase 2a Risk of killing/injuring.		Low	Low	Assessment Phase 2a and 2b will result in the further loss of grassland, scrub and waterbody habitats which are considered likely to provide foraging and shelter opportunities for grass snake (assumed to be present across the site). The removal of which has the potential to kill or injure reptiles during site clearance and habitat establishment. Embedded mitigation reduces this to a low adverse effect at the local level which equates to a **minor adverse effect,** which is **not significant**.		**Negligible effect,** which is **not significant**
Assessment Phase 2b Risk of killing/injuring.		Low	Low			**Negligible effect,** which is **not significant**
Reptiles - habitat						
Assessment Phase 1 Loss of habitat.	Provision of suitable replacement habitat within landscape design.	Medium	Low	The provision of open space and habitat creation measures within the Proposed Development will reduce the effect of the loss of habitats used by reptiles. However, it is recognised that time is required for the replacement habitats to establish to a level at which they provide an equivalent resource to that loss. The loss of foraging habitats to the construction of the Proposed Development represents a temporary adverse impact, of medium	Provision of hibernacula/log piles within suitable locations in new and retained habitats, along with further suitable habitat creation and appropriate management (Amphibian and Reptile Mitigation Strategy, **Appendix 8.6** of this ES **[TR020001/APP/5.02]**).	**Minor beneficial effect** which is **not significant** due to the increased areas of suitable habitat that is secured and managed long term**.**
Assessment Phase 2a Loss of habitat.		Medium	Low			
Assessment Phase 2b Loss of habitat.		Medium	Low			

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
				magnitude, on these local level receptors. This equates to a **minor adverse effect**, which is **not significant**, increasing to a **negligible** effect when habitats have established, within 5-10 years following each assessment phase, which is **not significant**.		
Amphibians (common species) – risk of killing/injuring						
Assessment Phase 1 Risk of killing/injuring.	Supervised, staged clearance of suitable habitats within the construction site at an appropriate time of year (April – October) as detailed within the CoCP **(Appendix 4.2** of this ES **[TR020001/APP/5.02]**).	Medium	Low	Risk of killing/injuring amphibians species (smooth newts, common toad and common frog) during site clearance works required for construction of the Proposed Development. This represents an adverse effect at the local level. However, embedded mitigation reduces the likelihood of impacts to amphibians to a medium magnitude which equates to a **minor effect,** which is **not significant**.	Translocation of amphibians to suitable replacement habitat during drain-down of ponds within the Main Application Site.	Temporary **minor adverse** residual effect while new habitats establish (5-10 years), decreasing to a **negligible effect,** which is **not significant.**
Assessment Phase 2a Risk of killing/injuring.		Medium	Low			
Assessment Phase 2b Risk of killing/injuring.		Low (small loss of habitat)	Low	Risk of killing/injuring amphibians species remains during site clearance works, although for a smaller area of habitat. This represents an adverse effect at the local level. However, embedded mitigation reduces the likelihood of impacts to amphibians to a low magnitude, which equates to a **minor effect,** which is **not significant**.		
Amphibians – loss of aquatic and terrestrial habitats						
Assessment Phase 1 Loss of habitat, terrestrial and Pond 12.	Provision of suitable replacement terrestrial habitat within landscape design.	Medium	Low	Loss of one pond (Pond 12) (**Figure 8.3** of this ES **[TR020001/APP/5.03]**) and large areas of associated suitable terrestrial habitats, that are likely to be utilised by common amphibians for foraging, shelter and breeding. This represents a medium adverse effect at the local level which equates to a **minor effect,** which is **not significant**.	Bird strike risk restricts creation of large waterbodies within the Proposed Development however a cluster of small wildlife ponds and associated terrestrial habitats are proposed within the habitat creation area at the east of the development. This cluster of small ponds will be designed specifically for amphibians, and the majority of ponds lost comprise soakaways and fire training pools of limited biodiversity value.	Temporary **minor adverse** residual effect while new habitats establish (5-10 years), decreasing to a **negligible effect** in the long term which is **not significant.**
Assessment Phase 2a Loss of habitat, terrestrial and Ponds 8, 13, 14 and 15.		Medium	Low	Loss of four ponds and associated suitable terrestrial habitats, that are likely to be utilised by common amphibians for foraging, shelter and breeding. This represents a medium adverse effect at the local level which equates to a **minor effect,** which is **not significant**.		
Assessment Phase 2a		Low (small loss of habitat)	Low	Loss of two ponds (Pond 5 and 6) (**Figure 8.3** of this ES **[TR020001/APP/5.03]**) and associated suitable terrestrial habitats, that		Temporary **negligible** effect while new habitats

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
Loss of habitat, terrestrial and Ponds 5 and 6.				are likely to be utilised by common amphibians for foraging, shelter and breeding. This represents a medium adverse effect at the local level which equates to a **negligible effect**, which is **not significant**.		establish (5-10 years), which is **not significant**
Roman snail – loss of habitat						
Assessment Phase 1 Loss of habitat	No habitat loss where Roman snail are present are anticipated as a result of construction of assessment phase 1 of the Proposed Development.					
Assessment Phase 2a Loss of habitat.	Provision and management of suitable replacement terrestrial habitat within landscape design, including within Dairyborn Scarp DWS.	Medium	Low	Roman snail [redacted]. Existing habitat management [redacted] already deters this species from the Main Application Site so habitat lost within proximity to the nearby population would not be detrimental to them. However, should any population be found to remain present within [redacted] following the pre-construction surveys, then the loss of the areas of suitable habitat [redacted] would present a loss for this species. This represents a temporary medium adverse effect at the local level, which equates to a **minor adverse effect**, which is **not significant**, decreasing to a **negligible** effect when habitats have established, within 5 years, which is **not significant**.	None required	A temporary medium adverse effect at the local level, which equates to a **minor adverse effect**, which is **not significant**, decreasing to a **negligible** effect when habitats have established, within 5 years, which is **not significant**.
Assessment Phase 2b Loss of habitat.	No habitat loss where Roman snail are present are anticipated as a result of construction of assessment phase 2b of the Proposed Development as the existing habitat management [redacted] already deters this species from the Main Application Site so habitat lost within proximity to the nearby population would not be detrimental to them.					
Roman snail - Risk of killing / injury						
Assessment Phase 1 Risk of killing / injury.	No direct or indirect effects upon the habitat where Roman snail are present are anticipated as a result of construction of assessment phase 1 of the Proposed Development.					
Assessment Phase 2a Risk of killing / injury.	To avoid roman snail entering the Proposed Development, appropriate habitat management is required	Medium	Low	Roman snail are [redacted] **Figure 8.3** of this ES **[TR020001/APP/5.03]**) [redacted].	Translocation of Roman snails to suitable remaining habitat during site clearance (if required) within the Main Application Site under a Natural	**Negligible effect**, which is **not significant**

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
	to remain in place to ensure minimal suitable vegetation [redacted]. This is captured within the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**) and **Appendix 8.10** Orchid and Invertebrate Mitigation Strategy of this ES **[TR020001/APP/5.02]**.			Risk of killing/injuring Roman snail during site clearance works required for construction of the Proposed Development. This represents an adverse effect at the local level. Embedded mitigation reduces the likelihood of roman snail entering the construction zone [redacted] Any remaining population [redacted] This represents a medium magnitude, on these local level receptors. This equates to a **minor adverse effect**, which is **not significant**.	England conservation licence agreed in advance as stated within **Appendix 8.10** Orchid and Invertebrate Mitigation Strategy of this ES **[TR020001/APP/5.02]**.	
Assessment Phase 2b Risk of killing / injury.	To avoid roman snail entering the Proposed Development then appropriate habitat management is required to remain in place to ensure minimal suitable vegetation [redacted] This is captured within the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**) and **Appendix 8.10** Orchid and Invertebrate Mitigation Strategy of this ES **[TR020001/APP/5.02]**.	Very low	Low	Roman snail are [redacted] (**Figure 8.3** of this ES **[TR020001/APP/5.03]**). Risk of killing/injuring Roman snail during site clearance works required for construction of the Proposed Development. This represents an adverse effect at the local level. However embedded mitigation reduces the likelihood of roman snail entering the construction zone of the Proposed Development to a very low magnitude, on these local level receptors. This equates to a **negligible effect**, which is **not significant**.	None required	**Negligible effect**, which is **not significant**
Invertebrates						
Assessment Phase 1 Loss of habitat.	Habitat creation within landscape design: edge habitats, early successional bare ground with ruderal habitats and hedgerows.	Medium	Medium	Loss of habitats supporting a notable assemblage of invertebrates to construction of the Proposed Development. This represents a temporary medium adverse effect at the county level, which equates to a **moderate adverse effect**, which is **significant**, decreasing to a **minor adverse** effect when habitats have established, within 5 years, which is **not significant**.	As stated within **Appendix 8.10** Orchid and Invertebrate Mitigation Strategy of this ES **[TR020001/APP/5.02], c**reation of Habitat Creation Areas and enhancement through management of wider 'green corridor' network of hedgerows and trees, translocation of birds-foot trefoil turfs during the	Temporary **minor adverse** and **negligible** residual effects while new habitats establish, rising to a **negligible** impact in the long term, which is **not significant** once the habitats have established within 5 years.
Assessment Phase 2a Loss of habitat.		Medium	Medium			

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
Assessment Phase 2b Loss of habitat.		Low (smaller area)	Medium	Loss of small areas of existing habitats potentially still supporting a notable assemblage of invertebrates. This represents a temporary low adverse effect at the county level, which equates to a **minor adverse effect**, which is **not significant**, decreasing to a **negligible** effect when habitats have established, within 5 years, which is **not significant**.	orchid translocation, dead wood retention including standing dead wood where possible as well as off-site agricultural management to create margins with no insecticide usage along enhanced hedgerows. In addition, introduction of low intensity grazing regimes are proposed to further mitigate for the loss of invertebrate habitats with appropriate management of field margins and bare ground on bunds.	
Invertebrates						
Assessment Phase 1 Risk of harm	N/A	Low	Medium	Work during the construction would inevitably result in the death of a range of ground dwelling invertebrates, particularly slower moving, flightless arthropods, which cannot avoid the area. This is unlikely to permanently affect the population dynamics of any community. Direct mortality caused by the construction of assessment Phase 1 would constitute an impact of low magnitude at the county level, that equates to a **minor adverse** effect, which is **not significant**	N/A	**Minor adverse** residual effect, which is **not significant**.
Assessment Phase 2a Risk of harm		Low	Medium			
Assessment Phase 2b Risk of harm		Low	Medium			
Operation						
SSSIs which fall within 5km of the Main Application Site and/or 200m of the ARN, comprising Galley and Warden Hills SSSI (within 5km and 200m of the ARN)**, Cowslip Meadow SSSI** (within 5km and 200m of the ARN)**, Dallow Downs and Winsdon Hill SSSI** (within 5km and 200m of the ARN)**, Smithcombe, Sharpenhoe and Sundon Hills SSSI** (within 200m of the ARN)**, Wain Wood SSSI** (within 5km).						
Assessment Phase 1 - Air quality changes. No effects on these SSSIs are anticipated as air quality modelling results placed them all well below a 1% change during assessment Phase 1, maximum of 0.071 kgN/ha/yr. Galley and Warden Hills SSSI shows an improvement of 0.09 (0.013 kgN/ha/yr).						
Assessment Phase 2a - Air quality changes. No effects on these SSSIs are anticipated as air quality modelling results placed them all well below a 1% change during assessment Phase 2a, maximum of 0.05 kgN/ha/yr.						
Assessment Phase 2b - Air quality changes. No effects on these SSSIs are anticipated as air quality modelling results placed them all below a 1% change during assessment Phase 2b, maximum of 0.06 kgN/ha/yr, with the exception of Dallow Downs and Winsdon Hill SSSI which although is greater than a 1% increase, it is a 0.23 increase in kgN/ha/yr which is below the 0.4 kgN/ha/yr guideline for a minimum dose associated with a reduction in 'species richness'. Cowslip Meadow SSSI actually shows an improvement by assessment Phase 2b of 0.47% (0.05 kgN/ha/yr) and Smithcombe, Sharpenhoe and Sundon Hills SSSI an improvement of 0.83% (0.08 kgN/ha/yr).						
Wigmore Park CWS						
Assessment Phase 1 Surface water runoff, and	Drainage strategy (**Appendix 20.4** of this ES **[TR020001/APP/5.02]**), Lighting design including directional lighting to limit	Low	Medium	The operation of the temporary surface car parks P5-7 within close proximity to the remaining area of Wigmore Park CWS, has the potential to locally impact on the quantity and direction of surface runoff, and increase lighting, on the temporarily	N/A	Temporary **adverse effect**, of low magnitude, on this county value receptor. **Minor adverse effect**, which is **not significant**

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
increase lighting.	light spill onto adjacent habitats.			remaining area of CWS resulting in a temporary adverse effect, of low magnitude, on this county value receptor. This equates to a **minor adverse effect**, which is **not significant.**		
Assessment Phase 2a and b - No effect as CWS will no longer exist as a functional CWS due to only 6.6% of the original area remaining in assessment Phase 2a and 1.3% in assessment Phase 2b.						
Winch Hill Wood CWS/LWS Ancient Woodland – non Air Quality related effects						
Assessment Phase 1 - No anticipated operational impacts relating to biodiversity on Winch Hill Wood CWS/LWS Ancient Woodland during assessment Phase 1 of the Proposed Development, other than air quality which is captured below.						
Assessment Phase 2a Potential for extension of airport platform including car parks P10 and fuel storage facility to locally impact on the quantity and direction of surface runoff, and increase lighting.	Directional lighting to limit light spill onto adjacent habitats (**Design Principles** document **[TR020001/APP/7.09])**. Habitat creation at the margins of the Proposed Development to act as a screen for adjacent habitats. Drainage design to ensure no substantial change to surface water run off to woodland (**Appendix 20.4** of this ES **[TR020001/APP/5.02]**).	Low	Medium	The extension of the airport platform and creation of long-stay car parking within close proximity to Winch Hill Wood has the potential to change the quantity and direction of surface runoff (due to increased impermeable surfaces and steep bund slopes to the west and north of the woodland), which could lead to degradation of the ancient woodland community. This has the potential to represent an adverse effect at the county level. However, this is reduced to a **Minor adverse effect** with embedded mitigation that is **not significant**.	N/A.	**Minor adverse**, effect which is **not significant**
Assessment Phase 2b Potential for extension of long stay car parks P11 and fuel storage facility to locally impact on the quantity and direction of surface runoff, and increase lighting.	Directional lighting to limit light spill onto adjacent habitats (**Design Principles** document **[TR020001/APP/7.09])**. Additional habitat creation at the margins of the Proposed Development to act as a screen for adjacent habitats. Drainage design to ensure no substantial change to surface water run off to woodland (**Appendix 20.4** of this ES **[TR020001/APP/5.02]**).	Low	Medium	The extension of the long-stay car parking within close proximity to Winch Hill Wood has the potential to change the quantity and direction of surface runoff (due to increased impermeable surfaces and steep bund slopes to the west and north of the woodland), which could lead to degradation of the ancient woodland community. This has the potential to represent a permanent adverse effect at the county level. However, this is reduced to a **Minor adverse effect** with embedded mitigation that is **not significant**.	N/A.	**Minor adverse**, effect which is **not significant**
Winch Hill Wood CWS/LWS Ancient Woodland – Air Quality effects						

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
Assessment Phase 1 Air quality changes. Winch Hill Wood CWS/LWS/AW was assessed within **Chapter 7** of this ES **[TR020001/APP/5.01]**, as it falls within the Main Application Site.	Measures within the Operational Air Quality Plan, **Appendix 7.5** of the ES **[TR020001/APP/5.02]**.	Very Low	Medium	The assessment used the critical load of 10 kgN/ha/yr and determined that the contribution of the Proposed Development to change exceeds 1% of the relevant air quality objective and Critical Loads, however the maximum nitrogen dose is just below 0.4 kgN/ha/yr through the woodland, which is the guideline for a minimum dose associated with a reduction in 'species richness'. This represents a permanent adverse impact, of very low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant**	Management of woodland for improvement in condition over a 50-year period, as per the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**). This will lead to improvement of the woodland overall, but will take time to achieve.	**Minor adverse**, effect which is **not significant**
Assessment Phase 2a Air quality changes	Measures within the Operational Air Quality Plan, **Appendix 7.5** of the ES **[TR020001/APP/5.02]**.	Low	Medium	The Air Quality assessment for assessment Phase 2a determined that the contribution of the Proposed Development to change exceeds 1% of the relevant air quality objective and Critical Loads. A transect through the woods was assessed and the maximum nitrogen dose was 1.0 kgN/ha/yr through to 110m into the woodland, which is greater than 0.4 kgN/ha/yr. The CWS/LWS is already subject to high background N deposition due to existing sources. The actual proportional change in N deposition is 2.8% (1 kgN/ha/yr on top of a predicted Do Minimum of 35.8 kgN/ha/yr), and is unlikely to cause any further significant adverse changes within the habitats (Ref. 8.60).. This represents a permanent adverse impact, of low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant.** There will also be a reduction in agriculture in this area due to the Proposed Development as a result of parts of the provision of open space and Habitat Creation Area which will lower the overall change in N deposition.	Management of woodland for improvement in condition over a 50-year period, as per the Outline LBMP (**Appendix 8.2,** of this ES **[TR020001/APP/5.02]**).	Temporary **minor adverse** effect in the short term, falling to a **negligible adverse** impact in the long term, which is **not significant** once the management practices implemented shows improvement in the woodland condition overall. These management practices will commence at assessment Phase 1 and so would already be showing benefit by assessment Phase 2a.
Assessment Phase 2b Air quality changes	Measures within the Operational Air Quality Plan, **Appendix 7.5** of the ES **[TR020001/APP/5.02]**.	Low	Medium	The Air Quality assessment for assessment Phase 2b determined that the contribution of the Proposed Development to change exceeds 1% of the relevant air quality objective and Critical Loads. A transect through the woods was assessed	Management of woodland for improvement in condition over a 50-year period, as per the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**).	Temporary **minor adverse** effect in the short term, falling to a **negligible adverse** impact in the long term, which is **not significant**

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
				and the maximum nitrogen dose was 1.84 to 1.65 kgN/ha/yr for one moving from the edge of the woods to 110m along the transect. All of these values are above 0.4 kgN/ha/yr. However, the maximum proportional change on top of the already high background N deposition due to existing sources is 5.1% (a 1.84 kgN/ha/yr on top of a predicted Do Minimum of 35.8 kgN/ha/yr) and is unlikely to cause any further significant adverse changes within the habitats (Ref. 8.60). This represents a permanent adverse impact, of low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant**. As stated in assessment Phase 2a above, the reduction in agriculture will lower the overall change in N deposition.		once the management practices implemented shows improvement in the woodland condition overall. These management practices will commence at assessment Phase 1 and so would already be showing benefit by assessment Phase 2b.
Luton Parkway Verges DWS						
Assessment Phase 1 – there will be no operational effect on **Luton Parkway Verges DWS** other than for air quality.						
Assessment Phase 1 Air quality changes Luton Parkway Verges DWS was assessed within **Chapter 7** of this ES **[TR020001/APP/5.01]**, as it falls within the Main Application Site and 200m of the ARN.	Measures within the Operational Air Quality Plan, **Appendix 7.5** of the ES **[TR020001/APP/5.02]**.	Very Low	Medium	Although the assessment predicted the change in air quality for nitrogen deposition would be greater than 1% of the relevant air quality objective and Critical Loads (15kgN/ha/yr for this DWS), it is only 0.22 kgN/ha/yr which is almost half the value of 0.4 kgN/ha/yr which is the guideline for a minimum dose associated with a reduction in 'species richness'. This represents a permanent adverse impact, of very low magnitude, on this county value receptor, which equates to a **minor adverse**, effect which is **not significant**.	None	**Minor adverse**, effect which is **not significant**.
Assessment Phases 2a and 2b Potential for shading impacts and trampling (cut through) as a result of construction of multi-storey carpark directly	Any remaining areas of Luton Parkway Verges DWS that falls within the LLAL ownership will be subject to management measures to promote the diverse botany for which the site is designated, this will include measures such as mowing and removal of arisings, and	Low	Medium	Multi storey car park shading of habitats of DWS together with trampling and littering pressures will be a permanent adverse impact, of low magnitude, on the function of the county value site, which equates to a **minor adverse effect** that is **not significant**.	In order to reduce recreational pressures, such as trampling and littering, upon the designating habitats of the DWS, post and rail fencing will be established to deter 'cut throughs' from the new car park, interpretation boards will be erected to explain the value of the DWS, monitoring and management for litter removal	The mitigation will reduce the recreational pressure to a **negligible** residual effect, which is **not significant**. However, no mitigation can be provided for the potential shading effect which remains a **minor adverse effect**, which is **not significant**

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
adjacent to DWS to any remaining areas of the DWS.	scrub management to prevent encroachment and shading.				will be enacted. These measures will be detailed within the Outline LBMP **(Appendix 8.2** of this ES **[TR020001/APP/5.02]**)	
Assessment Phases 2a and 2b Air quality changes	Measures within the Operational Air Quality Plan, **Appendix 7.5** of the ES **[TR020001/APP/5.02]**.	Low	Medium	The Air Quality assessment for assessment Phases 2a and 2b determined that the contribution of the Proposed Development to change exceeds 1% of the relevant air quality objective and Critical Loads. A transect through the DWS was assessed and the maximum N dose was 0.76 kgN/ha/yr for assessment Phase 2a and 0.93 kgN/ha/yr for assessment Phase 2b. All of these values are above 0.4 kgN/ha/yr. However, the maximum proportional change on top of the already high background N deposition due to existing sources is 1.9% and 2.2% (of a predicted Do Minimum of 39.3 and 41.6 kgN/ha/yr) and is unlikely to cause any further significant adverse changes within the habitats (Ref. 8.60). This represents a permanent adverse impact, of low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant**.	Management of any remaining or reinstated areas of the DWS within the Order Limits for improvement in condition over a 50-year period, as per the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**). No management would be undertaken for the area outside of the Order Limits.	**Minor adverse** effect which is **not significant**. This would be permanent for the area outside of the Order Limits, but could be in the short term for any remaining or reinstated areas of the DWS within the Order Limits due to management. It would then fall to a **negligible adverse** impact in the long term, which is **not significant** once the management implemented shows improvement in the DWS condition within the Order Limits. These management practices will commence at assessment Phase 2a and so would already be showing benefit by assessment Phase 2b.
Assessment Phase 2b – there will be no additional operational effect on **Luton Parkway Verges DWS**						
Dairyborn Scarp DWS						
Assessment Phase 1 – there will be no operational effect on **Dairyborn Scarp DWS** other than for air quality.						
Assessment Phase 1 Air quality changes Dairyborn Scarp DWS was assessed within **Chapter 7** of this ES **[TR020001/APP/5.01]**, as it falls within the Main Application Site	Measures within the Operational Air Quality Plan, **Appendix 7.5** of the ES **[TR020001/APP/5.02]**.	Low	Medium	The assessment predicted the change in air quality for N deposition would be greater than 1% of the relevant objective and Critical Loads (10kgN/ha/yr for this DWS). Transects were assessed and the maximum N dose was 0.19 kgN/ha/yr in the 20m transect (this lies 92m from the ARN) and is below 0.4 kgN/ha/yr. The 60m transect showed 1.27 kgN/ha/yr at the roadside, dropping to 0.9 by 10m into the transect and to 0.61 at 60m, which all are above 0.4 kgN/ha/yr. However, the maximum proportional change on top of the already high background N deposition	None	**Minor adverse**, effect which is **not significant**.

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
and 200m of the ARN.				due to existing sources is 2.6% (of a predicted Do Minimum of 48.4 kgN/ha/yr) and is unlikely to cause any further significant adverse changes within the habitats (Ref. 8.60). This represents a permanent adverse impact, of low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant**.		
Assessment Phases 2a Air quality changes	Measures within the Operational Air Quality Plan, **Appendix 7.5** of the ES **[TR020001/APP/5.02]**.	Low	Medium	The assessment predicted the change in air quality for N deposition would be greater than 1% of the relevant objective and Critical Loads (10kgN/ha/yr for this DWS) for both transects undertaken. The maximum N dose was found to be 1.09 kgN/ha/yr at the roadside, dropping to 1 at 60m along the 60m transect, and 0.46 to 0.48 at 20m along the 20m transect. Both are greater than 0.4 kgN/ha/yr, although only just for the 20m transect. However, the maximum proportional change on top of the already high background N deposition due to existing sources is 2.28% (of a predicted Do Minimum of 47.9 kgN/ha/yr) and is unlikely to cause any further significant adverse changes within the habitats (Ref. 8.60). This represents a permanent adverse impact, of low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant**.	Management of any remaining or reinstated areas of the DWS within the Order Limits for improvement in condition over a 50-year period, as per the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**). No management would be undertaken for the area outside of the Order Limits.	**Minor adverse** effect which is **not significant**. This would be permanent for the area outside of the Order Limits, but could be in the short term for any remaining or reinstated areas of the DWS within the Order Limits due to management. It would then fall to a **negligible adverse** impact in the long term, which is **not significant** once the management practices implemented shows improvement in the DWS condition within the Order Limits.
Assessment Phase 2b Air quality changes	Measures within the Operational Air Quality Plan, **Appendix 7.5** of the ES **[TR020001/APP/5.02]**.	Low	Medium	The assessment predicted the change in air quality for N deposition would be greater than 1% of the relevant objective and Critical Loads (10kgN/ha/yr for this DWS) for both transects undertaken. The maximum N dose was found to be 1.06 kgN/ha/yr at the roadside, changing to 1.27 at 60m along the 60m transect, and 0.58 to 0.61 at 20m along the 20m transect. Both are greater than 0.4 kgN/ha/yr. However, the maximum proportional change on top of the already high background N deposition due to existing sources is 3.2% (of a predicted Do Minimum of 39.7 kgN/ha/yr) and is unlikely to cause any further significant adverse changes within the habitats (Ref. 8.60). This represents a permanent adverse	Management of any remaining or reinstated areas of the DWS within the Order Limits for improvement in condition over a 50-year period, as per the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**). No management would be undertaken for the area outside of the Order Limits.	**Minor adverse** effect which is **not significant**. This would be permanent for the area outside of the Order Limits, but could be in the short term for any remaining or reinstated areas of the DWS within the Order Limits due to management. It would then fall to a **negligible adverse** impact in the long term, which is **not significant** once the management practices implemented shows improvement in the DWS

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
				impact, of low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant**.		condition within the Order Limits. These management practices will commence at assessment Phase 2a and so would already be showing benefit by assessment Phase 2b.
Burnt Wood LWS						
Assessment Phase 1 Air quality changes. Burnt Wood LWS was assessed within **Chapter 7** of this ES **[TR020001/APP/5.01]**, as it falls within 2km of the Main Application Site.	Measures within the Operational Air Quality Plan, **Appendix 7.5** of the ES **[TR020001/APP/5.02]**.	Very Low	Medium	The assessment used the critical load of 10 kgN/ha/yr and determined that the contribution of the Proposed Development to change exceeds 1% of the relevant air quality objective and Critical Loads, however the maximum N dose is 0.2 kgN/ha/yr at the edge of the woodland, and is below 0.4 kgN/ha/yr. This represents a permanent adverse impact, of very low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant**	N/A	**Minor adverse**, effect which is **not significant**
Assessment Phase 2a Air quality changes	Measures within the Operational Air Quality Plan, **Appendix 7.5** of the ES **[TR020001/APP/5.02]**.	Low	Medium	The Air Quality assessment for assessment Phase 2a determined that the contribution of the Proposed Development to change exceeds 1% of the relevant air quality objective and Critical Loads. A transect through the wood was assessed and the maximum N dose was 0.54 to 0.41 kgN/ha/yr through to 200m within the woodland, which is just greater than 0.4 kgN/ha/yr. However, the maximum proportional change on top of the already high background N deposition due to existing sources is 1.54% (of a predicted Do Minimum of 35.3 kgN/ha/yr) and is unlikely to cause any further significant adverse changes within the habitats (Ref. 8.60). This represents a permanent adverse impact, of low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant.** There will also be a reduction in agriculture in this area due to the Proposed Development as a result of parts of the provision of open space and Habitat	N/A	**Minor adverse**, effect which is **not significant**

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
				Creation Area which will lower the overall change in nitrogen deposition.		
Assessment Phase 2b Air quality changes	Measures within the Operational Air Quality Plan, **Appendix 7.5** of the ES **[TR020001/APP/5.02]**.	Low	Medium	The Air Quality assessment for assessment Phase 2b determined that the contribution of the Proposed Development to change exceeds 1% of the relevant objective and Critical Loads. A transect through the wood was assessed and the maximum N dose was 0.9 to 0.66 kgN/ha/yr through to 200m within the woodland, which is just greater than 0.4 kgN/ha/yr. However, the maximum proportional change on top of the already high background N deposition due to existing sources is 2.55% (of a predicted Do Minimum of 35.3 kgN/ha/yr) and is unlikely to cause any further significant adverse changes within the habitats (Ref. 8.60). This represents a permanent adverse impact, of low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant**. As stated in assessment Phase 2a above, the reduction in agriculture will lower the overall change in N deposition.	N/A	**Minor adverse**, effect which is **not significant**
Kidney and Bull Woods CWS/ Ancient Woodland						
Assessment Phase 1 Air quality changes. Kidney and Bull Woods CWS/AW was assessed within **Chapter 7** Air Quality of this ES **[TR020001/APP/5.01]**, as it falls within 2km of the Main Application Site and 200m of the ARN	Measures within the Operational Air Quality Plan, **Appendix 7.5** of the ES **[TR020001/APP/5.02]**	Low	Medium	The air quality assessment used the critical load of 10 kgN/ha/yr and determined that the contribution of the Proposed Development to change exceeds 1% of the relevant air quality objective and Critical Loads to 200m for one transect and 60m of the second. However the maximum N dose is 1.19 and 0.74 kgN/ha/yr at the roadside, falling below the 0.4 kgN/ha/yr by 40m and 20m into the transects. One transect also shows a positive change in values between 100m and 200m up to 0.15 kgN/ha/yr.. However, the maximum proportional change on top of the already high background N deposition due to existing sources is 2.17% (of a predicted Do Minimum of 54.8 kgN/ha/yr) and is unlikely to cause any further significant adverse changes within the habitats (Ref. 8.60).	N/A	**Minor adverse**, effect which is **not significant**

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
				This represents a permanent adverse impact, of low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant.**		
Assessment Phase 2a Air quality changes	Measures within the Operational Air Quality Plan, **Appendix 7.5** of the ES **[TR020001/APP/5.02]**	Low	Medium	The Air Quality assessment for assessment Phase 2a determined that the contribution of the Proposed Development to change exceeds 1% of the relevant air quality objective and Critical Loads to 200m for one transect and 100m of the second. However the maximum N dose is 1.36 and 1.87 kgN/ha/yr at the roadside, falling to 1 and 1.19 kgN/ha/yr by 10m in and to below 0.4 kgN/ha/yr by 60m and 80m respectively. One transect also shows a positive change in values between 130m and 170m up to 0.05 kgN/ha/yr. However, the maximum proportional change on top of the already high background N deposition due to existing sources is 3.52% (of a predicted Do Minimum of 53.3 kgN/ha/yr) and is unlikely to cause any further significant adverse changes within the habitats (Ref. 8.60). This represents a permanent adverse impact, of low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant.**	N/A	**Minor adverse**, effect which is **not significant**
Assessment Phase 2b Air quality changes	Measures within the Operational Air Quality Plan, **Appendix 7.5** of the ES **[TR020001/APP/5.02]**	Low	Medium	The Air Quality assessment for assessment Phase 2b determined that the contribution of the Proposed Development to change exceeds 1% of the relevant objective and Critical Loads to 200m for one transect and 100m of the second. The maximum N dose is 2.46 and 1.58 kgN/ha/yr at the edge of the roadside for each transect (composite site),. However, this falls to 1.56 and 1.14 kgN/ha/yr 10m in, and to below 0.4 kgN/ha/yr before it reaches 100m and 60m in. One transect also shows a positive change in values between 120m and 200m up to 0.07 kgN/ha/yr. However, the maximum proportional change on top of the already high background N deposition due to existing sources is 4.7% (of a predicted Do Minimum of 52.2 kgN/ha/yr) and is unlikely to cause any further significant adverse changes within the habitats (Ref. 8.60).	N/A	**Minor adverse**, effect which is **not significant**

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
				This represents a permanent adverse impact, of low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant.**		
Luton Hoo Park CWS/River Lea CWS						
Assessment Phase 1 Air quality changes. Luton Hoo Park CWS and River Lea CWS were assessed within **Chapter 7** Air Quality of this ES **[TR020001/APP/5.01]**, as they fall within 2km of the Main Application Site and 200m of the ARN. On one point assessed they fall adjacent to each other.	Measures within the Operational Air Quality Plan, **Appendix 7.5** of the ES **[TR020001/APP/5.02]**	Low	Medium	The air quality assessment used the critical load of 10 kgN/ha/yr and determined that the contribution of the Proposed Development to change exceeds 1% of the relevant air quality objective and Critical Loads to 200m for one transect and 100m of the second. However the maximum N dose is 0.56 and 0.99 kgN/ha/yr at the roadside, falling below 0.4 kgN/ha/yr by 20m into the transects. However, the maximum proportional change on top of the already high background N deposition due to existing sources is 1.9% (of a predicted Do Minimum of 50.6 kgN/ha/yr) and is unlikely to cause any further significant adverse changes within the habitats (Ref. 8.60). This represents a permanent adverse impact, of low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant.**	N/A	**Minor adverse**, effect which is **not significant**
Assessment Phase 2a Air quality changes	Measures within the Operational Air Quality Plan, **Appendix 7.5** of the ES **[TR020001/APP/5.02]**	Low	Medium	The Air Quality assessment for assessment Phase 2a determined that the contribution of the Proposed Development to change exceeds 1% of the relevant air quality objective and Critical Loads for the whole of both transects. However the maximum N dose is 1.34 and 1.16 kgN/ha/yr at the roadside, falling to 0.85 and 0.8 kgN/ha/yr by 10m in and to below 0.4 kgN/ha/yr by 80m and 60m respectively. However, the maximum proportional change on top of the already high background N deposition due to existing sources is 2.7% (of a predicted Do Minimum of 49.5 kgN/ha/yr) and is unlikely to cause any further significant adverse changes within the habitats (Ref. 8.60). This represents a permanent adverse impact, of low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant.**	N/A	**Minor adverse**, effect which is **not significant**

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
Assessment Phase 2b Air quality changes	Measures within the Operational Air Quality Plan, **Appendix 7.5** of the ES **[TR020001/APP/5.02]**	Low	Medium	The Air Quality assessment for assessment Phase 2b determined that the contribution of the Proposed Development to change exceeds 1% of the relevant air quality objective and Critical Loads for the whole of both transects. The maximum N dose is 1.71 and 1.67 kgN/ha/yr at the edge of the roadside for each transect, which lies above 0.4 kgN/ha/yr. However, this falls to 1.14 and 1.13 kgN/ha/yr 10m in, and to below 0.4 kgN/ha/yr before it reaches 140m and 90m in. However, the maximum proportional change on top of the already high background N deposition due to existing sources is 3.5% (of a predicted Do Minimum of 48.2 kgN/ha/yr) and is unlikely to cause any further significant adverse changes within the habitats (Ref. 8.60). This represents a permanent adverse impact, of low magnitude, on this county value receptor. This equates to a **minor adverse**, effect which is **not significant.**	N/A	**Minor adverse**, effect which is **not significant**
Wildlife Sites, Ancient Woodlands and Ancient and Veteran Trees – within 2km of the Main Application Site and/or 200m of the ARN with greater than 1% predicted change and greater than a 0.4 kgN/ha/yr change Slaughters Wood and Green Lane CWS/AW, Heavens Wood & Chalk Wood LWS/AW, Vauxhall Way LWS, The Chase LWS, Riverside Walk CWS, Honeygate and Crick Hills LWS, Priory Park Icehouse LWS, Kingshoe Wood CWS/AW, River Flit CWS, Stockwood Park CWS, AVT 175839						
Assessment Phase 1 Air quality changes These sites were assessment within **Chapter 7** of this ES **[TR020001/APP/5.01]**, as they fall within 2km of the Proposed Development **and/or** 200m of the ARN.	Measures within the Operational Air Quality Plan, **Appendix 7.5** of the ES **[TR020001/APP/5.02]**	Low	Medium	The assessment used the appropriate critical load for each of these sites, and determined that the contribution of the Proposed Development to change just exceeds 1% of the relevant air quality objective and Critical Loads, and the maximum N dose is 0.4 kgN/ha/yr which is above the 0.4 kgN/ha/yr guideline for a minimum dose associated with a reduction in 'species richness' for the following sites. However, these maximum proportional changes on top of the already high background N deposition due to existing sources are unlikely to cause any further significant adverse changes within the habitats (Ref. 8.60). Vauxhall Way LWS – 4.65% (2.3 on top of 49.8 kgN/ha/yr) dropping to 4.14% by 10m (1.68 on top of 40.4 kgN/ha/yr) (and shows a positive change in later assessment phases).	N/A	**Minor adverse**, effect which is **not significant**

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
				Riverside Walk CWS - 1.4% (0.5 on top of 36.9 kgN/ha/yr) dropping to below 0.4 kgN/ha/yr by 10m. Honeygate and Crick Hills LWS - 1.7% (0.6 on top of 36.1 kgN/ha/yr) dropping to below 0.4 kgN/ha/yr by 10m. This represents a permanent adverse impact, of low magnitude, on these county value receptors. This equates to a **minor adverse**, effect which is **not significant.**		
Assessment Phase 2a Air quality changes	Measures within the Operational Air Quality Plan, **Appendix 7.5** of the ES **[TR020001/APP/5.02]**	Low	Medium	The assessment used the appropriate critical load for each site, and determined that the contribution of the Proposed Development to change just exceeds 1% of the relevant air quality objective and Critical Loads, and greater than the 0.4 kgN/ha/yr guideline for a minimum dose associated with a reduction in 'species richness' for the following sites. However, these maximum proportional changes on top of the already high background N deposition due to existing sources are unlikely to cause any further significant adverse changes within the habitats (Ref. 8.60). Slaughters Wood and Green Lane CWS/AW – 2% (0.8 on top of 39.5 kgN/ha/yr) roadside only. Heavens Wood & Chalk Wood LWS – 1.94% (0.98 on top of 50.6 kgN/ha/yr) single location. The Chase LWS – 0.9% (0.42 on top of 46.7 kgN/ha/yr) single location. Priory Park Icehouse LWS – 1.96% (0.9 on top of 46.1 kgN/ha/yr) single location. Stockwood Park CWS, AVT 175839 - 2% (1.04 on top of 51.1 kgN/ha/yr) single location. This represents a permanent adverse impact, of low magnitude, on these county value receptors. This equates to a **minor adverse**, effect which is **not significant.**	N/A	**Minor adverse**, effect which is **not significant**
Assessment Phase 2b Air quality changes	Measures within the Operational Air Quality Plan, **Appendix 7.5** of the ES **[TR020001/APP/5.02]**	Low	Medium	The assessment used the appropriate critical load for each site, and determined that the contribution of the Proposed Development to change just exceeds 1% of the relevant air quality objective and Critical Loads, and greater than the 0.4	N/A	**Minor adverse**, effect which is **not significant**

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
				kgN/ha/yr guideline for a minimum dose associated with a reduction in 'species richness' for the following sites. However, these maximum proportional changes on top of the already high background N deposition due to existing sources are unlikely to cause any further significant adverse changes within the habitats (Ref. 8.60). Slaughters Wood and Green Lane CWS/AW – 3.16% (1.24 on top of 39.2 kgN/ha/yr) dropping to below 0.4 kgN/ha/yr by 10m. Heavens Wood & Chalk Wood LWS – 0.9% (0.46 on top of 50.8 kgN/ha/yr) single location. The Chase LWS – 0.93% (0.43 on top of 45.8 kgN/ha/yr) single location. Honeygate and Crick Hills LWS - 1.49% (0.5 on top of 34.2 kgN/ha/yr) dropping to below 0.4 kgN/ha/yr by 10m. Priory Park Icehouse LWS – 3% (1.34 on top of 44.9 kgN/ha/yr) single location. Kingshoe Wood CWS - 0.74% (0.41 on top of 55.6 kgN/ha/yr) single location. River Flit CWS – 1.9% (1.08 on top of 56.6 kgN/ha/yr single location. This represents a permanent adverse impact, of low magnitude, on these county value receptors. This equates to a **minor adverse**, effect which is **not significant.**		
Wildlife Sites, Ancient Woodlands and Ancient and Veteran Trees – within 2km of the Main Application Site and/or 200m of the ARN with greater than 1% predicted change but of less than a 0.4 kgN/ha/yr change Furzen Wood AW, Stubbocks Wood LWS/AW, Watkin's Wood and Lord's Wood LWS/AW , Sewetts Wood and Sellbarns Dell LWS/AW, Withstocks Wood LWS/AW, Slaughters Wood AW (not the CWS part), George Wood CWS/AW, Hardingdell Woods and Fernell's Wood CWS/AW, Horsleys Wood CWS/AW, Birch Wood, Apps Pond wood LWS, Bury Wood (near Redbourn) LWS, Nicky Way Dismantled Railway LWS, Batford Springs and Meadow LWS, Church Cemetery Luton LWS, Hitchin Road Spinney LWS, River Lea LWS/CWS (multiple locations), Limekiiln Wood LWS, Diamondend Springs, Limekiln Wood, Pondcroft LWS, Sloughs Wood LWS, Laysbury Dells LWS, Hurst Wood LWS, Chilten Green CWS, Stockwood Park CWS/DWS, Wandon End Park CWS, Dunstable to Luton disused railway CWS, Stockingstone Hill DWS, Croda Colloids CWS, River Lea DWS, Bramingham and Icknield Corridor DWS, Barton Quarry CWS, Hexton Chalk Pit LWS, Hexton Chalk Pit Road Verge LWS, Folly Alder Swamp LWS, Batford Springs LNR, River Flit CWS, Riverside Walk CWS, Great Hayes Wood DWS, Icknield Way below Telegraph Hill LWS, AVT 180612, AVT 8261, AVT 6217 101, AVT 60815/AVT 60809, AVT 60772						
Various assessment Phases Air quality changes	Measures within the Operational Air Quality Plan, **Appendix 7.5** of the ES **[TR020001/APP/5.02]**	Very Low	Medium	The assessment used the critical load of for all of these sites or trees, using the appropriate critical load for each, determined that the contribution of the Proposed Development to change exceeds 1% of the relevant air quality objective and Critical Loads, however the	N/A	**Minor adverse**, effect which is **not significant**

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
These sites were assessment within **Chapter 7** of this ES **[TR020001/APP/5.01]**, as they fall within 2km of the Proposed Development **and/or** 200m of the ARN.				maximum N dose is less than 0.4 kgN/ha/yr which is below the guideline for a minimum dose associated with a reduction in 'species richness'. This represents a permanent adverse impact, of very low magnitude, on these county value receptors. This equates to a **minor adverse**, effect which is **not significant.**		
Habitats – none – refer to the designated site and ancient woodland section for effects on those areas of ancient woodland scoped in to the assessment for air quality effects						
Species						
Orchids						
Assessment Phase 1 Recreational pressure.	The park has been designed to include defined footpaths to channel the public away from sensitive retained habitats. The embedded mitigation which forms part of assessment Phases 1, 2a and 2b construction includes creation of neutral and calcareous grassland, and also bare chalk slopes, which are highly suitable for pyramidal and bee orchids, as detailed within the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**).	Low	Medium	The degradation of the orchid population in the provision of open space as a result of recreational pressures represents a permanent adverse impact, of low magnitude, on this district value receptor. This equates to a **minor adverse**, effect which is **not significant**.	The translocation exercise, outlined in the **Appendix 8.10** Orchid and Invertebrate Mitigation Strategy of this ES **[TR020001/APP/5.02]** will utilise two receptor sites, one within the provision of open space, where the orchids will be accessible by members of the public and therefore subject to a degree of recreational pressure although the footpaths will reduce this, and another location within the wider habitat creation area away from areas of anticipated high footfall.	Following the successful establishment of translocated orchids to the two receptor areas, a permanent adverse impact, of very low magnitude, on this district value receptor remains. This equates to a residual **negligible effect**, which is **not significant**.
Assessment Phase 2a and b	The operation of assessment Phase 2a and b of the Proposed Development are not anticipated to result in residual effects upon the orchid assemblage					
Badger						
All assessment phases – disturbance through noise, lighting and recreational pressure.	Directional lighting to limit light spill onto adjacent habitats. Additional habitat creation at the margins of the Proposed Development to act as a	Very low	Low	The disturbance of retained setts and habitats used by badger through lighting, noise and as a result of recreational pressures to social groups already used to high levels of disturbance associated with the existing airport and open spaces, represents a permanent adverse impact, of very low magnitude, on this low value	The provision of open space has been designed to include defined footpaths to channel the public away from sensitive retained habitats (Badger Mitigation Strategy, **Appendix 8.7** of this ES **[TR020001/APP/5.02]**). The	A permanent adverse impact, of very low magnitude, on this low value receptor remains. This equates to a residual **negligible effect**, which is **not significant**.

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
	screen for adjacent habitats.			receptor. This equates to a **negligible effect**, which is **not significant**. By later stages, habitats created in assessment Phase 1 and assessment Phase 2a will have matured and provide additional screening of effects.	Habitat Creation Area will not be subject to the same recreational pressure.	
Bats						
Assessment Phase 1 Disturbance of habitats and roosts.	Lighting design including directional lighting to limit light spill onto adjacent habitats. Landscape mitigation at the margins of the airport development and associated infrastructure to act as a screen between the Proposed Development and adjacent habitats, including bund and landscape planting.	Low (more limited activity levels found close to the existing airport)	Medium	The assessment Phase 1 works include the provision of temporary car parks adjacent to the retained section of Wigmore Park, along with increased take-off/landing activity. The increased light and noise spill onto adjacent habitats, including those utilised as bat flight lines, could result in displacement and loss of foraging habitat. This has the potential to represent an adverse effect at the district level assemblage. However, the embedded mitigation measures reduces this to a **minor adverse effect**, in the short term, which is **not significant,** reducing to a **negligible effect** in the long term as screening habitats mature (5-10 years).	Habitat creation areas within the Proposed Development, i.e. at distance from the noise source, to provide alternative roosting and foraging opportunities. Strengthening of hedgerows and woodland corridors both within the Order Limits and within the wider landscape (hedgerow enhancements) to provide ecological connectivity and new commuting routes for bats. Additional mitigation including baffles, cowls and hoods in appropriate areas will further reduce light spill (as described in the **Design Principles** document **[TR020001/APP/7.09]**). Artificial roost provision a suitable distance from the airport for bats (Bat Mitigation Strategy, **Appendix 8.8** of this ES **[TR020001/APP/5.02]**).	**Negligible effect,** which is **not significant**
Assessment Phase 2a Disturbance of habitats and roosts.		Medium (closer to more important habitats)	Medium	Increased take-off/landing activity and the extension of the airport platform and associated infrastructure has the potential to result in increased light and noise spill onto adjacent habitats, including those utilised as bat flight lines, resulting in displacement and loss of foraging habitat from larger areas of retained habitats in close proximity. This has the potential to represent an adverse effect at the district level assemblage. However, the embedded mitigation measures reduces this to a **moderate adverse effect**, in the short term, which is **not significant,** reducing to a **minor adverse effect** in the long term as habitats mature (5-10 years).		**Negligible effect,** which is **not significant**
Assessment Phase 2b Disturbance of habitats and roosts.		Low (areas already affected during assessment Phase 2a)	Medium	The increased take-off/landing activity and the operation of the airport infrastructure within proximity to retained habitats will result in an increase in noise and light levels. This has the potential to represent an adverse effect at the district level assemblage. However, the embedded mitigation measures reduces this to a **minor adverse effect**, in the short term,		**Negligible effect,** which is **not significant**

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
				which is **not significant,** reducing to a **negligible effect** in the long term as screening habitats mature (5-10 years).		
Bird assemblage						
All assessment phases Bird strike risk.	Landscape design includes habitats appropriate to manage the bird strike risk to an acceptable level, Bird Strike Risk Assessment **Appendix 8.4** of this ES **[TR020001/APP/5.02]**. Appropriate habitat management regime described in the Outline LBMP (**Appendix 8.2** of this ES **[TR020001/APP/5.02]**).	Very Low	Low	The increased frequency of aircraft movements associated with the airport expansion may increase the risk of bird strike. However, a detailed assessment of the potential for a significant increase in bird strike risk has been undertaken, and is reported within the Bird Strike Risk Assessment **Appendix 8.4** of this ES **[TR020001/APP/5.02]**. In summary the Bird Strike Risk Assessment, concludes that with the continuation of the monitoring and control measures employed by the airport operator there will be no significant increase in bird strike risk. Due to the implementation of appropriate management of habitats within proximity of the aerodrome to deter birds, there would be a **negligible** impact on bird populations in the local area, which is **not significant**.	The creation of suitable nesting and foraging habitats further from the Proposed Development may result in these areas being preferentially used by species such as red kite and barn owl, that are currently a bird strike risk, with known nesting sites immediately south and east of the Proposed Development.	Once habitat creation areas further from the Proposed Development have matured (5-10 years), there may be a **negligible effect**, which is **not significant**.
Schedule 1 birds – Barn owl and Red kite						
All assessment Phases Disturbance to Schedule 1 birds (such as barn owl and red kite).	Replacement foraging habitats within landscape design. These will be located away from the main flight path to avoid bird strike issues. The park has been designed to include defined footpaths to channel the public away from sensitive retained habitats.	Low	Medium	The increased frequency of vehicle movements on roads around the airport, and increase in flights may increase disturbance to Schedule 1 birds, such as barn owl and red kite, nesting within proximity to these roads, and changes to the location of the public open space in relation to these sites. This has the potential to represent an adverse effect at the district level assemblage. However, embedded mitigation measures reduces this to a low magnitude on these county level receptors, resulting in a **minor adverse effect**, which is **not significant**.	Artificial roost provision a suitable distance from the airport for barn owl (Bird Mitigation Strategy, **Appendix 8.9** of this ES **[TR020001/APP/5.02]**). Additional creation of grassland, hedgerows and woodland providing alternative foraging and nesting opportunities for this species in the Habitat Creation Area and the hedgerow enhancements in the wider area.	Temporary **minor adverse residual** effect while replacement habitats establish (5-10 years), rising to **negligible** in the long term, which is **not significant**.
Roman snail						
All assessment Phases Risk of killing / injury.	To avoid roman snail entering the operational site then appropriate habitat management is required to ensure minimal vegetation [redacted]	Very low	Low	Roman snail [redacted] (**Figure 8.3** of this ES **[TR020001/APP/5.03]**). Risk of killing/injuring Roman snail during operation of the Proposed Development through their encroachment into the active	None required	**Negligible effect,** which is **not significant.**

Impact	Embedded/ Good Practice Mitigation	Magnitude	Receptor Value	Description of effect and significance	Additional Mitigation	Residual Effect
	[redacted] Orchid and Invertebrate Mitigation Strategy, **Appendix 8.10** of this ES **[TR020001/APP/5.02]**.			airport. However embedded mitigation reduces the likelihood of roman snail entering the Proposed Development to a very low magnitude, on these local level receptors. This equates to a **negligible effect**, which is **not significant**.		

COMPETENT EXPERTS

Topic	Role	Company	Qualifications/competencies/experience of author
Biodiversity	Author	Arup	BSc Biology, MSc Ecology and Management of the Natural Environment, 11 years' experience as an ecology consultant - specialising in terrestrial ecology, MCIEEM.
Biodiversity	Author	AECOM	BSc Zoology and Marine Biology, MSc Ecology, 19 years' experience as an ecology consultant – specialising in terrestrial ecology, MCIEEM
Biodiversity	Technical Reviewer	AECOM	BSc Environmental Science, MSc Estuarine and Coastal Zone Management, 26 years' experience in environmental management including 12 years as an ecology consultant – specialising in terrestrial and aquatic ecology
Biodiversity	Technical Reviewer	Arup	BSc Geography, MSc Environmental Management, 21 years' experience as an environmental consultant – specialising in terrestrial ecology, MCIEEM, CEnv.
Biodiversity	Technical Reviewer	Arup	BSc Geography, PhD Hydrology and Hydroecology, 22 years post-doctoral experience as an ecological consultant – specialising in terrestrial ecology and ornithology, MCIEEM, CEnv.

GLOSSARY AND ABBREVIATIONS

Term	Definition
AAR	Airport Access Road
AIA	Arboricultural Impact Assessment
ANPS	Airports National Policy Statement
APIS	Air Pollution Information System
ARG	Amphibian and Reptile Group
ARN	Affected Road Network
ATM	Air Transport Movements
AW	Ancient Woodland
BAP	Biodiversity Action Plan
BCMP	Bird Control Management Plan
BLBRMC	Bedfordshire and Luton Biodiversity Recording and Monitoring Centre
BNG	Biodiversity Net Gain
BOA	Biodiversity Opportunity Area
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CBC	Central Bedfordshire Council
CIEEM	Chartered Institute of Ecology and Environmental Management
CIIC	In-combination Climate Change Impact
CoCP	Code of Construction Practice
CRoW	Countryside and Rights of Way
cSAC	candidate Special Area of Conservation
CWS	County Wildlife Site
Luton DART	Luton Direct Air-Rail Transit
DAS	Discretionary Advice Service
dDCO	draft Development Consent Order
DWS	District Wildlife Site
EA	Environment Agency
EC	European Community
EcIA	Ecological Impact Assessment
ECoW	Ecological Clerk of Works
eDNA	environmental DNA
EEC	European Economic Community
EIA	Environmental Impact Assessment

Term	Definition
ES	Environment Statement
EU	European Union
GCN	Great Crested Newt
ha	Hectare
HCC	Hertfordshire County Council
HERC	Herts Environmental Records Centre
HMWT	Herts and Middlesex Wildlife Trust
HoPI	Habitat of Principal Importance
HRA	Habitat Regulations Assessment
HSI	Habitat Suitability Index
ICCI	In-combination Climate Change Impacts
INNS	Invasive Non-Native Species
IRZ	Impact Risk Zone
kgN/ha/yr	Kilogram of Nitrogen per hectare per year
km	Kilometre
LLAL	London Luton Airport Limited
LBAP	Local Biodiversity Action Plan
LBC	Luton Borough Council
LBMP	Landscape and Biodiversity Management Plan
LDF	Local Development Frameworks
LLAOL	London Luton Airport Operations Limited (the airport operator)
LNR	Local Nature Reserve
LWS	Local Wildlife Site
m	Metre
m^2	Metre squared
m^3	Metre cubed
µgm-3	Microgram per cubic metre
mppa	Million passenger per annum
MAGIC	Multi-Agency Geographic Information for the Countryside
N	Nitrogen
NE	Natural England
NERC	Natural Environment and Rural Communities
NHDC	North Hertfordshire District Council
NNR	National Nature Reserve

Term	Definition
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxide
NPPF	National Planning Policy Framework
NPSNN	National Policy Statement for National Networks
NSER	No Significant Effects Report
NSIPs	Nationally Significant Infrastructure Projects
NVC	National Vegetation Classification
ODPM	Office of the Deputy Prime Minister
PPG	Planning Practice Guidance
PEIR	Preliminary Environmental Information Report
pSPA	potential Special Protection Area
RPZ	Root Protection Zones
SAC	Special Area of Conservation
SO_2	Sulphur Dioxide
SPA	Special Protection Area
SRN	Strategic Road Network
SSSI	Sites of Special Scientific Interest
TCPA	Town and Country Planning Act
TWG	Technical Working Group
WFD	Water Framework Directive
WTBCN	Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire
ZOI	Zone of Influence

REFERENCES

Ref 8.1 Natural Environment and Rural Communities (NERC) Act (2006). *Natural Environment and Rural Communities Act 2006, Chapter 16.* Her Majesty's Stationary Office, London.
Ref 8.2 Biodiversity Metric 3.1 - Auditing and accounting for biodiversity calculation tool. Natural England. Available at [redacted] (Accessed: 12/09/2022).
Ref 8.3 Environment Act (2021). His Majesty's Stationary Office, London.
Ref 8.4 European Union (Withdrawal Agreement) Act 2020. His Majesty's Stationary Office, London.
Ref 8.5 The Conservation of Habitats and Species Regulations 2017 (as amended). His Majesty's Stationary Office, London.
Ref 8.6 Countryside and Rights of Way Act (2000). His Majesty's Stationary Office, London.
Ref 8.7 The Hedgerows Regulations (1997). His Majesty's Stationary Office, London.
Ref 8.8 Protection of Badgers Act (1992). His Majesty's Stationary Office, London.
Ref 8.9 Convention on the Conservation of European Wildlife and Natural Habitats (ETS No. 104) (1979). Council of Europe.
Ref 8.10 Wildlife and Countryside Act (1981) (as amended). His Majesty's Stationary Office, London.
Ref 8.11 Convention on the conservation of migratory species of wild animals (Bonn Convention) (1979)
Ref 8.12 Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (codified version) (legislation.gov.uk).
Ref 8.13 Secretary of State (2017) Water Environment (Water Framework Directive) (England and Wales) Regulations.
Ref 8.14 The Invasive Alien Species (Enforcement and Permitting) Order (2019). His Majesty's Stationary Office, London.
Ref 8.15 EC (2014). Regulation (EU) No 1143/2014 of the European Parliament and of the Council of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species. EC, Brussels.
Ref 8.16 Ministry of Housing, Communities & Local Government, (2021). Revised National Planning Policy Framework.
Ref 8.17 Department for Transport (2014) National Policy Statement for National Networks
Ref 8.18 Department for Environment Food and Rural Affairs (2011). *Biodiversity 2020: A strategy for England's wildlife and ecosystem services*. August 2011. Defra, London.
Ref 8.19 Luton Borough Council. (2017) Local Plan 2011–2031.
Ref 8.20 Central Bedfordshire Council. (2021) Central Bedfordshire Local Plan 2015-2035.]
Ref 8.21 North Hertfordshire District Council. (2022) North Hertfordshire Local Plan 2011-2031.
Ref 8.22 Dacorum Borough Council. (2013) Core Strategy 2006-2031.
Ref 8.23 Bedfordshire and Luton Biodiversity Recording and Monitoring Centre. Biodiversity Action Plan.
Ref 8.24 Hertfordshire Environmental Forum (2006). A Biodiversity Action Plan for Hertfordshire.
Ref 8.25 Bedfordshire County Council. (2008). The Rebuilding Biodiversity in South Bedfordshire and Luton.
Ref 8.26 Herts and Middlesex Wildlife Trust. (2018). Hertfordshire's Ecological Networks: A report on the current situation and priorities for restoration.
Ref 8.27 Department for Transport. (2018). Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England. (June 2018).
Ref 8.28 Department for Transport (2018) Beyond the horizon, The future of UK aviation, Making best use of existing runways, June 2018. Available at: https://www.gov.uk/government/publications/aviation-strategy-making-best-use-of-existing-runways [Accessed: 30/11/22].
Ref 8.29 Office of the Deputy Prime Minister (ODPM) (2005) Circular 06/2005: Biodiversity and Geological Conservation - Statutory Obligations and Their Impact Within The Planning System. (August 2005) ODPM.
Ref 8.30 Chartered Institute of Ecology and Environmental Management (CIEEM) (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine, (Version 1.1 updated September 2019). CIEEM, Winchester.
Ref 8.31 The Planning Inspectorate (2022) Advice note Ten: Habitats Regulations Assessment relevant to nationally significant infrastructure projects (V9) (2022) The Planning Inspectorate. Bristol.
Ref 8.32 Civil Aviation Authority. (2017) *Wildlife Hazard Management at Aerodromes. CAP 772*. West Sussex: Civil Aviation Authority.
Ref 8.33 Mammals of the British Isles: Handbook, 4th Edition. Edited by S. Harris & D.W. Yalden. Mammal Society 2008.

Ref 8.34 Joint Nature Conservation Committee (2010). *Handbook for Phase 1 habitat survey – a technique for environmental audit*.
Ref 8.35 Joint Nature Conservation Committee (2006). *National Vegetation Classification: Users' handbook*.
Ref 8.36 Defra (2007). Hedgerow Survey Handbook: A standard procedure for local surveys in the UK. 2nd Edition.
Ref 8.37 The Mammal Society. *Surveying Badgers* (1989).
Ref 8.38 Natural England. *Protection of Badgers Act 1992 (as amended): Guidance on 'Current Use' in the definition of a Badger Sett* (2009)..
Ref 8.39 Collins, J. (ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd Edition). London: The Bat Conservation Trust
Ref 8.40 English Nature. (2006). *The Dormouse Conservation Handbook. 2nd Edition* (2006). English Nature.
Ref 8.41 Chanin, P. (2003). *Ecology of the European Otter. Conserving Natura 2000 Rivers Ecology Series No. 10.* English Nature, Peterborough.
Ref 8.42 Crawford, A. (2003). *Fourth Otter Survey of England 2000-2002*. Environment Agency, Bristol.
Ref 8.43 Dean, M, Strachan, R., Gow, D. and Andrews, R. 2016. *The Water Vole Mitigation Handbook (the Mammal Society Mitigation Guidance Series).* Eds Fiona Matthews and Paul Chanin. The Mammal Society, London.
Ref 8.44 English Nature (2001). *Great Crested Newt Mitigation Guidelines*. English Nature, Peterborough.
Ref 8.45 Amphibian and Reptile Group UK (2010). Advice Note 5: Great Crested Newt Habitat Suitability Index..
Ref 8.46 Froglife. (2016). *Surveying for reptiles*.
Ref 8.47 Gent,T. & Gibson, S. (eds). (2003) *Herpetofauna Workers' Manual (revised reprint)*. Peterborough: JNCC
Ref 8.48 Marchant J.H. (1983). *BTO Common Bird Census Instructions*. British Trust for Ornithology, Tring.
Ref 8.49 Gilbert G., Gibbons D.W. and Evans J. (1998). *Bird Monitoring Methods: A Manual of Techniques for Key UK Species.* Sandy: Royal Society for the Protection of Birds.
Ref 8.50 The Barn Owl Trust. (2012). *Barn Owl Conservation Handbook: A comprehensive guide for ecologists, surveyors, land managers and ornithologists*. Pelagic Publishers, UK.
Ref 8.51 E.Pollard (1975) Aspects of the Ecology of Helix *pomatia L*. *Journal of Animal Ecology.* Vol 44. No.1.
Ref 8.52 Ratcliffe, D.A. (1977). A Nature Conservation Review, Cambridge University Pres
Ref 8.53 Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA and Gregory RD, (2015). Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man. *British Birds*, 108, 708-746.
Ref 8.54 Royal Society for the Protection of Birds (RSPB). Wildlife guides birds A-Z: House Sparrow.
Ref 8.55 Botanical Society of Britain & Ireland website. (Accessed: Dec/2022)
Ref 8.56 Forestry Commission, Natural England. (2018). Ancient Woodland, Ancient Trees and Veteran Trees: Protecting them from Development. Natural England.
Ref 8.57 Ancient Woodland, Ancient Trees and Veteran Trees: Protecting them from Development. Natural England.
Ref 8.58 Natural England. (2018).Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations. Version: June 2018'.
Ref 8.59 Highways England (2019). *Design Manual for Roads and Bridges, LA 105 Air quality*. (Revision 0, November 2019).
Ref 8.60 Natural England. (2016).Assessing the effects of small increments of atmospheric nitrogen deposition (above the critical load) on semi-natural habitats of conservation importance (NECR210). (Edition 1, March 2016).