Chapter F
Ecology

Milton Keynes East Environmental Statement

Chapter F: Ecology

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F1.0 Introduction

F1.1 This Chapter forms part of the Milton Keynes East Environmental Statement ('ES') which sets out the findings of an Environmental Impact Assessment ('EIA') of the proposed development of a sustainable urban extension ('SUE') to Milton Keynes. It relates to land to the east of the M1 motorway and to the south of Newport Pagnell. A description of the background to the proposal; the relationship of this chapter to the wider ES; and a description of the site and the development is provided at Chapters A to C of this ES.

F1.2 This Chapter reports the assessment of the potential for likely significant environmental effects arising from the Proposed Development in relation to ecology. It has been prepared in accordance with the Town and Country Planning (EIA) Regulations 2017 and the Chartered Institute of Ecology and Environmental Management's (CIEEM) 'Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine' Ref 6.

F1.3 The Chapter describes the consultation that has been undertaken during the EIA, the scope of the assessment and assessment methodology, and a summary of the baseline information that has informed the assessment. As the EcIA has been carried out in accordance with the 2018 CIEEM guidelines (the professional standard for ecology), the structure of this chapter and terminology used differs to that employed in the ES chapters prepared by other disciplines. Effort has been made where appropriate however to ensure that any EIA relevant effects are clearly identified in addition to those simply requiring consideration from a policy or legislative perspective only.

F1.4 A number of effects have been avoided in advance of the assessment and where relevant, these are clearly stated. The assessment reports on the potential for likely significant ecological effects, the further mitigation measures required to prevent, reduce or offset any significant adverse effects, or further enhance beneficial effects. The conclusions are provided both in terms of the residual effects and whether these are considered significant. Due to the range of ecological receptors, for clarity of reporting these considerations are addressed on a receptor by receptor basis.

F1.5 This Chapter and its associated appendices are intended to be read as part of the wider ES with particular reference to the introductory chapters of this ES (Chapters A-C), as well as Chapter P (Cumulative Impact Assessment). The chapter is accompanied by the following figures (Volume 2 to this ES):-

- Figure F1 – Phase 1 Habitat Survey Plan;
- Figure F2 – Hedgerow Survey Results Plan;
- Figure F3 – Bat Roost Survey Summary Plan;
- Figure F4 – Bat Activity Transect Survey Summary Plan;
- Figure F5 – Water Vole and Otter Survey Summary Plan;
- Figure F6 – Badger Survey Summary Plan;
- Figure F7 – Reptile Survey Summary Plan;
- Figure F8 – Great Crested Newt Survey Summary Plan; and
- Figure F9 – Ecological Opportunities Plan.

F1.6 It is also accompanied by the following technical appendices (Volume 2 to this ES):-

- Appendix F1 Evaluation Criteria
- Appendix F2 Phase 1 Habitat Survey Target Notes

- Appendix F3 Desk Study Results
- Appendix F4 Hedgerow Survey Report
- Appendix F5 Botanical Survey Technical Note
- Appendix F6 Bat Survey Report
- Appendix F7 Bat Survey Report: Additional Areas
- Appendix F8 Dormouse Survey Report
- Appendix F9 Water Vole and Otter Survey Report
- Appendix F10 Water Vole and Otter Survey Report: Additional Areas
- Appendix F11 Badger Survey Report
- Appendix F12 Badger Survey Report: Additional Areas
- Appendix F13 Wintering and Breeding Bird Assessment
- Appendix F14 Reptile Survey Report
- Appendix F15 Reptile Survey Report: Additional Areas
- Appendix F16 Great Crested Newt HSI and eDNA Survey Report
- Appendix F17 Great Crested Newt Survey Report: Additional Areas
- Appendix F18 Invertebrate Survey Report

About the Author

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F2.0 Policy Context

F2.1 Planning policy, guidance and legislation of relevance to ecology and nature conservation is summarised below.

National Policy and Legislation

F2.2 The following nature conservation legislation has been considered in the preparation of this chapter:

- The 1981 Wildlife and Countryside Act (as amended);
- The 1997 Hedgerow Regulations;
- The 2000 Countryside and Rights of Way Act;
- The 2006 Natural Environment and Rural Communities (NERC) Act;
- The 1992 Protection of Badgers Act;
- The 1996 Wild Mammals (Protection) Act;
- The 2019Conservation of Habitats and Species (Amendment) (EU Exit) Regulations;
- The 2000 Water Framework Directive.

F2.3 Where applicable, details of the specific legislation relating to protected species are provided in the relevant specialist survey reports provided in Appendices F4 to 18 (Volume 2 to this ES).

National Planning Policy Framework

F2.4 The National Planning Policy Framework (NPPF), published in February 2019 [Ref 17] outlines the Government's vision for sustainable development in England. Chapter 15 sets out the requirements for 'Conserving and Enhancing the Natural Environment', which states:

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

a. protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);

b. recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;

c. maintaining the character of the undeveloped coast, while improving public access to it where appropriate;

d. minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;

e. preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and

f. remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate."

"171. Plans should: distinguish between the hierarchy of international, national and locally designated sites; allocate land with the least environmental or amenity value, where consistent with other policies in this Framework; take a strategic approach to maintaining and enhancing networks of habitats and green infrastructure; and plan for the enhancement of natural capital at a catchment or landscape scale across local authority boundaries."

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

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

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

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

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

b. development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest;

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

d. development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to incorporate biodiversity improvements in and around developments should be encouraged, especially where this can secure measurable net gains for biodiversity."

"176. The following should be given the same protection as habitats sites:

- potential Special Protection Areas and possible Special Areas of Conservation;

- listed or proposed Ramsar sites; and

- sites identified, or required, as compensatory measures for adverse effects on habitats sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites."

"177. 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 adversely affect the integrity of the habitats site."

Government Circular: Biodiversity and Geological Conservation – Statutory Obligations and their Impact within the Planning System Ref 21

F2.5 This provides guidance on the application of English law relating to planning and nature conservation, complementing the expression of national planning policy in the NPPF. In the context of planning applications, the circular includes guidance on the following:

1 Internationally designated sites;

2 Nationally designated sites;

3 Conservation of habitats and species outside designated sites;

4 Conservation of species protected by law;

5 Environmental Impact Assessment;

6 Strategic Environmental Assessment; and

7 The Water Framework Directive 2000.

Regional Planning Policy and Considerations

Buckinghamshire and Milton Keynes Biodiversity Action Plan (BAP)

F2.6 The Buckinghamshire and Milton Keynes Natural Environment Partnership has developed a spatial approach to biodiversity action planning which identifies the most important areas for biodiversity in the county through Biodiversity Opportunity Areas (BOAs). Buckinghamshire and Milton Keynes has 23 BOAs, with an additional two BOAs located predominantly in neighbouring counties but with small areas in Buckinghamshire. The site is not located within any BOA, but is located approximately 350m to the south of the Ouse Valley BOA. This 4338ha BOA is characterised by a narrow meandering river valley encompassing five Local Wildlife Sites (LWSs) and is noted for supporting areas of BAP habitats including floodplain grazing marsh, lowland wood-pasture and parkland, lowland calcareous grassland and reedbeds. The BOA also contains examples of pre-18th century hedgerows, eutrophic standing water, wet woodland, fen and lowland meadow, and the River Great Ouse which is known to support Otters.

F2.7 The Buckinghamshire and Milton Keynes Biodiversity Action Plan Ref 4 also lists a number of priority habitats for the county. These include:

1 Lowland wood pastures and parkland;

2 Traditional orchards;

3 Hedgerows;

4 Ponds;

5 Lowland heathland;

6 Lowland dry acid grassland;

7 Lowland meadows;

8 Lowland calcareous grassland;

9 Purple moorgrass and rush pastures;

10 Lowland fens;

11 Reedbed;

12 Coastal and floodplain grazing marsh;

13 Native woodland; and

14 Water Framework Directive (WFD) watercourses.

F2.8 The Plan identifies targets for the restoration of each habitat between the years 2010 and 2020, with the aim to achieve '*an increase in overall extent of priority habitats by at least 200,000 ha*'.

River Basin Management Plan: Anglian River Basin District [Ref 9]

F2.9 The Anglian River Basin Management Plan has been prepared by the Environment Agency under the Water Framework Directive which requires all countries throughout the European Union to manage the water environment to consistent standards. The Plan focuses on the protection, improvement and sustainable use of the water environment through the implementation of a series of formal six-year cycles. The plan is due to be reviewed in 2021 however objectives up to 2027 are expected to include measures to address physical modification and pollution from waste water, transport, urban and rural sources, measures to address changes to natural flow and water level, and measures to manage invasive non-native species.

F2.10 The Anglian river basin district includes the urban centres of Lincoln, Northampton, Milton Keynes and Chelmsford however it is a predominantly rural catchment, with more than 50% of land used for agriculture and horticulture. The Anglian river basin district has a rich diversity of wildlife and habitats, supporting many species of global and national importance and is recognised as a rich region for wetland wildlife.

Local Planning Policy and Considerations

Plan:MK 2016-2031 [Ref 15]

F2.11 Relevant policies from Milton Keynes Local Plan - Plan:MK, adopted in March 2019, relating to nature conservation and the environment include:

Policy NE1: PROTECTION OF SITES

"A. Development proposals which would likely cause harm to the nature conservation or geological interest of internationally (RAMSAR sites, SACs and SPAs) important sites will not be permitted unless:

1. There is no suitable alternative to the development;

2. There are imperative reasons of overriding public interest;

3. All reasonable possibilities for mitigation have been put in place; and

4. Compensatory provision in line with the mitigation hierarchy can be secured to ensure that the overall coherence of the site is protected and with the intent to achieve a net gain in biodiversity.

B. Development proposals which would likely cause harm to a National Nature Reserve, Site of Special Scientific Interest or irreplaceable habitats such as Ancient Woodland will not be permitted unless:

1. There is no suitable alternative to the development;

2. The benefits of the development, at this site, clearly outweigh the adverse impacts on the site;

3. All reasonable possibilities for mitigation have been put in place; and

4. Compensatory provision in line with the mitigation hierarchy to ensure that the overall coherence of the site is protected and with the intent to achieve a net gain in biodiversity.

C. Development proposals which would be likely to harm the biodiversity or geological conservation value of a site of countywide or local importance as shown on the Policies Maps or which serve as a 'biodiversity offset site' will only be permitted where:

1. The local development needs significantly outweigh the biodiversity or geological conservation value of the site;

2. All reasonable possibilities for mitigation have been put in place; and

3. Compensatory provision in line with the mitigation hierarchy can be secured to ensure that the overall coherence of the site is protected and with the intent to achieve a net gain in biodiversity."

Policy NE2: PROTECTED SPECIES AND PRIORITY SPECIES AND HABITATS

"A. Where there is a reasonable likelihood of the presence of statutorily protected species or their habitats development will not be permitted unless it has been demonstrated that the proposed development will not result in a negative impact upon those species and habitats.

B. Where the site contains priority species or habitats, development should wherever possible promote their preservation, restoration, expansion and/or re-creation in line with Policy NE3."

Policy NE3: BIODIVERSITY AND GEOLOGICAL ENHANCEMENT

"A. Development proposals will be required to maintain and protect biodiversity and geological resources, and wherever possible result in a measurable net gain in biodiversity, enhance the structure and function of ecological networks and the ecological status of water bodies in accordance with the vision and principles set out by the Buckinghamshire and Milton Keynes NEP.

B. If significant harm to biodiversity resulting from a development cannot be avoided, adequately mitigated or, as a last resort, compensated for then planning permission should be refused.

C. Development proposals of 5 or more dwellings or non-residential floorspace in excess of 1,000 sq. m will be required to use the Defra metric or locally approved Biodiversity Impact Assessment Metric to demonstrate any loss or gain of biodiversity.

D. Mitigation, compensation and enhancement measures must be secured and be maintained for the lifetime of the development. Enhancement and compensatory measures should seek opportunities for habitat protection, restoration and creation to meet the objectives of the UK and Bucks & Milton Keynes Biodiversity Action Plan and aims of the Biodiversity Opportunity Areas. These measures should also create and enhance habitats to help wildlife adapt to the impact of climate change."

Policy NE4: GREEN INFRASTRUCTURE

"A. The network of green infrastructure throughout the Borough will be protected, extended and enhanced for its biodiversity, recreational, accessibility, health and landscape value and for the contribution it makes towards combating climate change. This is in accordance with the vision and principles (and the large-scale zone maps of Green Infrastructure Opportunity) set out by the Buckinghamshire and Milton Keynes NEP.

B. Development proposals will provide new green infrastructure or, if it is not possible, will contribute to the enhancement and strengthening of existing green infrastructure to provide wellbeing benefits to people through access to nature.

C. Development proposals will ensure that existing ecological networks are identified and wherever possible maintained to avoid habitat fragmentation, and that ecological corridors, including water courses, form an essential component of their green infrastructure provision to support habitat connectivity.

D. Green infrastructure protection, improvements and creation must be prioritised in locations where it can deliver most benefits. It should be multi-functional to deliver as many ecosystem services as the site requires, for example flood mitigation, access to nature (wellbeing benefits), plants for pollinators, carbon sequestration, and habitat for wildlife.

E. The existing network of linear parks and linked parks and green spaces will be extended into the urban extensions and along the Ouse and Ouzel Valleys to the north to provide a well connected network of green infrastructure that:

1. Is strategically planned.

2. Is attractive and enhances the surrounding landscape.

3. Is safe and well used for recreation.

4. Meets the needs of existing and future residents.

5. Is designed to provide a range of ecosystem services e.g. manage flood risk or provide flower rich habitats that supports a diverse range of pollinators.

6. Is designed to support mitigation and adaptation to climate change e.g. through vegetation for carbon uptake (carbon sequestration).

7. Achieves a net gain in biodiversity.

8. Is managed into the long-term.

9. Where possible improves connectivity with other green infrastructure networks e.g. by linkages to the urban parks.

10. Where appropriate explores economic opportunities that will support the network's sustainability – for example in conservation, agriculture, renewable energy or outdoor environmental education or recreation; such activity must not result in a negative impact to the integrity of the network, the ecosystem services provided or on biodiversity.

F. Where green infrastructure is provided outside the linear parks system, applicants should detail how it will address the above requirements."

Draft Biodiversity Supplementary Planning Document [Ref 16]

F2.12 Milton Keynes Council has also prepared a Biodiversity Supplementary Planning Document which expands upon policies of Plan:MK. The SPD is intended to provide technical guidance throughout the planning process and supplements the policies within the Environment, Biodiversity and Geodiversity chapter of Plan:MK.

F2.13 The Draft Biodiversity SPD has completed a period of public consultation which closed on 23rd November 2020. Once adopted, the SPD will be a material consideration in the determination of planning applications submitted to the Council.

F3.0 Assessment Methodology & Significance Criteria

Assessment Methodology

F3.1 This Chapter of the ES forms an Ecological Impact Assessment (EcIA) carried out in accordance with the CIEEM 'Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine [Ref 6] and is based on ecological desk study information, the findings of a suite of ecological field surveys and the Proposed Development and plans described in Chapter C (Site and Scheme Description).

F3.2 The following have been included in the assessment of effects relating to ecology and nature conservation:

1 Effects on features of ecological interest supported by the Development Site and its surrounds; and

2 Effects on statutory and non-statutory designated areas occurring in the wider area.

Establishing the Zone of Influence

F3.3 The study area for the biodiversity surveys and assessment varies for different ecological features depending on their sensitivity. In a biodiversity assessment, this area is defined as the 'Zone of Influence' (ZoI) and is the area over which ecological features may be subject to significant effects as a result of the development and associated activities.

F3.4 Three potential ZOIs have been considered:

1 The site and its immediate surrounds;

2 Important areas and populations of species within the vicinity of the Development Site (drawing on the findings of the desk study described below); and,

3 Areas of international importance potentially affected by the Development.

F3.5 Key ecological resources and features (receptors) within the potential ZOIs of the Development have been identified and their value assessed.

Survey Methodologies

F3.6 In order to provide a robust baseline against which an assessment of the likely ecological effects of the Proposed Development can be made, an ecological desk study, extended Phase 1 habitat survey and specialist ecological surveys have been conducted. The process for establishing the ecological baseline at the Development Site has comprised the following three main components:

1 A desk-top search for existing ecological data pertaining to the Development Site and surrounding area, at a geographical scale sufficient to inform assessments of both the direct and indirect effects of the Proposed Development;

2 An extended Phase 1 habitat survey to establish the main habitat types, identify the presence of habitats and/or features likely to support rare, notable and/or protected species, and determine the need for further ecological survey; and

3 A suite of further ecological surveys to determine the presence/absence of rare, notable and/or protected habitats and species within areas of the Development Site potentially affected by the Proposed Development and, if present, establish the location, size and extent of these populations or features.

F3.7 The following sections provide summary information on each of these stages and brief details of the methodology for each of the ecological studies undertaken. The full methodologies employed in each survey are provided below or in the detailed reports which form Appendices F4-18 of this Chapter (Volume 2 to this ES).

Desk study

F3.8 An ecological desk study was carried out to gather any relevant existing information relating to potential ecological receptors within the Development Site and the surrounding area. This included searches for information relating to designated sites and existing records of any rare, notable and/or protected species from various sources including the Multi Agency Geographic Information for the Countryside (MAGIC) online database [Ref 14], Buckinghamshire and Milton Keynes Environmental Records Centre (BMERC), Buckinghamshire and Milton Keynes Natural Environment Partnership [Ref 4] and the Natural England online SSSI database [Ref 20]. Where available, ecological data previously obtained for the vicinity of the Development Site in relation to adjacent development projects was also reviewed [Refs 11 & 12].

F3.9 Although different habitats and species will be subject to different ZOIs, the standard desk study searches extended at least 2km from the Development Site boundary in relation to nationally and locally designated sites and rare, notable and/or protected species. For designated sites of international importance, the search area was extended to a radius of at least 10km from the Development Site. The results of the desk study are provided under the relevant sections below. Full findings of the desk study, including citation documents and location plans for designated sites, are provided in Appendix F3 (Volume 2 to this ES).

Phase 1 habitat survey

F3.10 An extended Phase 1 Habitat survey of the Development Site was initially conducted by WSP in in 2008 [Ref 28]. This established initial baseline ecological conditions and identified the need for further surveys where appropriate. The extended Phase 1 Habitat survey was revised and extended to cover previously unsurveyed areas by HDA during 2014, 2019, 2020 and 2021. The character and extent of habitats present at the Development Site were also subject to ongoing review and confirmed during other field surveys carried out up until 2021.

F3.11 The extended Phase 1 habitat surveys were conducted in order to establish initial baseline ecological conditions and to identify the need for further surveys where appropriate. The 2014-2021 surveys were conducted in accordance with the JNCC 2010 [Ref 13] methodology recommended by Natural England. During the surveys, dominant plant species were noted, along with any uncommon species or species indicative of particular habitat types, but no attempt to compile exhaustive species lists was made. Botanical names follow Stace [Ref 26] for higher plants.

F3.12 The results of the latest extended Phase 1 habitat survey work for the Development Site are summarised in Section F4 (Baseline Conditions) below, and on Figure F2 (Volume 2 to this ES) with target notes provided in Appendix F2 (Volume 2 to this ES).

Further ecological surveys

F3.13 During the initial and revised habitat surveys, habitats within the Development Site were appraised for their potential to support rare and/or protected habitats and species. Together with the results of the desk study, this information was used to determine the need for additional specialist species surveys to inform the EcIA.

F3.14 Where the results of the desk study and extended Phase 1 habitat survey indicated the presence and/or potential presence of habitats and species of nature conservation interest within the

Development Site, further ecological surveys were conducted to establish baseline conditions in relation to these habitats/species. These are identified below. Since some surveys represent comprehensive updates of previous surveys, brackets denote the year(s) in which the most recent surveys were completed in each case, with, in some cases, different parts of the Development Site being completed in different years:

1 Bat surveys (2019/2020/2021);

2 Dormouse survey (2012);

3 Otter and Water Vole survey (2019/2020/2021);

4 Badger survey (2019/2020/2021);

5 Wintering / Breeding Bird surveys (2018/2019);

6 Reptile survey (2018/2020);

7 Great Crested Newt surveys (2019/2020);

8 Invertebrate survey (2018/2019);

9 Hedgerow survey (2011/2020); and

10 Phase 2 botanical survey of grasslands (2019)

F3.15 Full details of the methodology for each specialist ecological survey undertaken are given in the reports of survey provided in Appendices F4-18 (Volume 2 to this ES).

Valuation of Ecological Resources

F3.16 The process of EcIA undertaken in accordance with the 2017 Town and Country Planning (Environmental Impact Assessment) Regulations and the CIEEM Guidelines [Ref 6] provides a mechanism by which to focus investigation on those activities that could potentially generate significant effects on ecological receptors. As such, the consideration of ecological effects represents a targeted assessment, rather than an exhaustive approach.

F3.17 Two independent factors contribute to the EcIA process: the value of a receptor; and the significance of the effect(s) upon it. Impact assessment is principally driven by the value of an ecological receptor, where valuation provides the basis for determining whether a receptor is of sufficient value for effect(s) upon it to be material in the determination process. Accurate valuation of ecological receptors is therefore critical to delivering this targeted approach.

F3.18 The value of ecological receptors (including habitats, ecological communities and individual or groups of species) has been determined on the basis of a combination of factors [Refs 6 & 25] including: habitat or population size, rarity, conservation status and geographical distribution at different spatial scales. Assigning value is relatively straightforward in the case of designated sites, or undesignated sites meeting designation criteria. However, in most cases evaluation of ecological resources is not straightforward and requires a degree of knowledge, training, experience and professional judgement [Refs 6, 25 & 27]. Following evaluation in accordance with these principles, receptors have been identified as being of value at a given geographical scale, namely: international; UK; national; regional; county; district; local; and site (within the Development Site only).

F3.19 The valuation of ecological receptors has been informed by a range of ecological studies and surveys which together provide a comprehensive ecological baseline for the assessment of the effects of the Proposed Development. These are described in Section F4 (Baseline Conditions) below. Whilst protected species are valued on the basis of their current conservation status and biodiversity value, the simple presence of a protected species does not necessarily infer value at the level of protection it receives.

Significance Criteria

F3.20 Having identified and valued the status of an ecological receptor, the assessment considers the potential environmental effects which may occur during the lifetime of the Proposed Development and characterises these effects in terms of their 'significance' on the identified receptor.

F3.21 The significance of an effect has been assessed based on whether or not the integrity of the habitat or species in that location will be affected. Determining factors include the following considerations:

1 Type of effect (direct or indirect);

2 The extent and magnitude of the effect (which may be expressed in terms of the proportion of the habitat or population affected but often requires a degree of subjective assessment);

3 The duration of the effect (short, medium or long term) and whether the effect is reversible, irreversible, permanent or temporary;

4 Whether the effect occurs in isolation or is cumulative; and

5 Whether the effect is adverse, negligible or beneficial.

F3.22 The significance of an effect is determined by appraisal of the above factors, irrespective of the value of the affected receptor. This Chapter has been prepared in accordance with CIEEM's 2018 guidelines [Ref 6] and therefore, unlike the approach used by other technical chapters in this ES (as set out in Chapter B) this Chapter uses CIEEM's definition of an ecologically significant effect which states that:

"Significance is a concept related to the weight that should be attached to effects when decisions are made. For the purpose of EcIA, 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features')…or for biodiversity in general. Conservation objectives may be specific (e.g. for a designated site) or broad (e.g. national/ local nature conservation policy) or more wide-ranging (enhancement of biodiversity). Effects can be considered significant at a wide range of scales from international to local" [Ref 6]

F3.23 Effects may occur at various stages during the Proposed Development, including: (i) site preparation works such as vegetation clearance and earthworks; (ii) construction and associated activities such as vehicle movements, noise and lighting; and (iii) during the operation of the Proposed Development. Table F5.2 identifies the expected effects arising from activities or environmental changes occurring during the various stages of the Proposed Development.

F3.24 'Likely Significant Effects' are those effects of the Proposed Development having potential to significantly affect an ecological receptor in a manner that has material implications in the EIA decision-making process, in the absence of any further impact avoidance, reduction, mitigation or compensation measures. Likely Significant Effects are generally those that may potentially arise in the absence of adequate mitigation measures on receptors that are of district/borough value or above. Where no significant effects are expected on ecological receptors, these have been scoped out of the assessment.

F3.25 Whilst certain ecological effects on receptors may not constitute Likely Significant Effects in the context of the Proposed Development, they may still be important for nature conservation and require consideration and further mitigation in accordance with relevant legislation, as well as in the context of national, regional and local planning policy. These effects are discussed in Section F8 below.

F3.26 In order to focus on the need for professional judgement, in recent years the CIEEM EcIA guidelines have moved away from a matrix-based approach for identification of ecological impacts and their relevance, or significance, to the decision-making process. Notwithstanding this, to enable completion of Table F10.1 in a manner consistent with other chapters, a matrix is provided in Table F3.1 below to allow some continuity of approach to identification of material effects in EIA terms across the ES.

Table F3.1 Significance matrix for ecology effects

		Sensitivity of Receptor (identified as value at geographic scale)					
		International	**National**	**County**	**District**	**Local**	**Site**
Impact (indicative)	**Large**	Major	Major	Major	Major	Moderate	Negligible
	Medium	Major	Major	Major	Major to Moderate	Minor	Negligible
	Small	Major	Major	Major to Moderate	Major to Moderate	Minor to negligible	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

F3.27 With regard to the effects identified in Table F3.1 above:

1 Major: Where the Proposed Development is expected to result in a significant effect. Potential for major effects on an ecological receptor is used in the identification of Likely Significant Effects.

2 Moderate: Where the Proposed Development may result in a significant effect. This is also used in the identification of Likely Significant Effects.

3 Minor: Where an effect may arise on an ecological receptor which may be significant at a local level.

4 Negligible: No discernible effect is expected to arise as a result of the Proposed Development.

Consultation

F3.28 Table F3.2 provides an overview of the consultation that has informed the design of the Proposed Development, the consideration of likely significant effects and the methodology for assessment.

Table F3.2 Summary of consultation

Body / Organisation	Main contact	Date and Form of Consultation	Summary
Milton Keynes Council (MKC)	Kelda Hudson (MKC Ecologist)	28/05/2020, 22/9/2020 and 10/12/2020	A series of meetings to discuss ecology, landscape and blue and green infrastructure. Discussions included: Scope and approach taken to ecological habitat and species survey work. Findings of work carried out and approach to avoidance and mitigation where required. Approach to assessment in the EIA (CIEEM Guidelines). Confirmed Habitats Regulations Assessment would not be required.

Body / Organisation	Main contact	Date and Form of Consultation	Summary
			Approach to green/ blue infrastructure provision discussed and associated habitat creation opportunities. Approach to management also discussed (balance of minimising maintenance costs with maximum benefits to biodiversity).
Milton Keynes Council (MKC)	Kelda Hudson (MKC Ecologist)	ES Scoping Opinion (see Appendix B2, Volume 2 to this ES)	Confirmed support for scope and approach to ecological survey work to support the ES. Identified that landscape strategy should demonstrate a net gain to biodiversity using an appropriate metric calculation. Identified need to consider impacts of construction.
Parks Trust	Steve Revill-Darton (Green Infrastructure Co-ordinator)	4/06/2020, 17/7/2020, 15/1/2021	A series of meetings to discuss ecology, landscape and blue and green infrastructure. Discussions included habitat creation opportunities associated with the highway/ movement infrastructure, linear park and wider Parks Trust land within and adjacent to the Development Site, together with appropriate management. Access strategy was also discussed with areas to target for informal recreation (e.g. linear park) and other to be discouraged (e.g. Pineham Nature Reserve).
Natural England	Ellen Satchwell (Sustainable Development Lead Advisor)	28/10/2020	Confirmed that ecology should be considered within the ES in accordance with CIEEM guidelines. Referred to need to consider internationally, nationally and locally designated sites. Referred to need to consider protected species and Habitats and Species of Principal Importance and Ancient Woodland.

Assumptions and Limitations

F3.29 In view of late expansion to the Development Site boundary in February 2021 to include small areas of additional land comprising an area of MKBC-owned land along the River Ouzel in the north-west of the Development Site, and small pockets of land along the A422 and Tongwell Street, a minority of the Phase 1 habitat survey work conducted to inform the assessment was carried out in February 2021. This is outside of the April to October optimal season for Phase 1 habitat surveys and some plant species may have been absent or inconspicuous. This is however unlikely to be a significant limitation in this instance due to the nature of the habitats present within these areas and the abundance of ecological survey data obtained in relation to the adjacent areas of the Development Site.

F3.30 Due to the timing of instruction on the baseline surveys of the additional areas of land discussed above, it was also not possible to complete Phase 2 bat surveys of several of the features with bat roost potential in advance of this assessment, or to carry out Great Crested Newt surveys of several ponds in the vicinity of these areas. All specific limitations encountered during these surveys are noted in the respective reports provided at Appendices F4-18 (Volume 2 to this ES), and where relevant, limitations are considered within the assessments presented in Sections F6.0-F7.0 of this Chapter.

F3.31 Minor additional limitations, common to many protected species surveys, are identified in the respective reports provided as Appendices F4 to F18 (Volume 2 to this ES). These are not considered likely to compromise the conclusions reached or recommendations made in this chapter.

F3.32 With due regard to the above, the Phase 1 habitat surveys and specialist ecological survey work conducted to inform this assessment were generally carried out during appropriate times of the year and during suitable weather conditions. Together with the desk study information obtained for this study, the survey data obtained is considered to be sufficient to inform the likely nature conservation importance of the Development Site and to inform the assessment and approach to avoidance, mitigation and compensation of effects identified in Sections F7.0 to F8.0 of this chapter.

F4.0 Baseline Conditions

Existing Conditions

F4.1 The following sections summarise the findings of the desk study, the Phase 1 habitat survey and the suite of specialist surveys carried out at the Development Site. Figures showing the key findings of the specialist surveys are provided at Volume 2 to this ES (Figures F1-10). Full survey results are provided in Appendices F2-18 (Volume 2 to this ES).

Designated sites

Desk study

F4.2 No statutory nature conservation designations pertain to the Development Site or adjacent land. This is confirmed by information from the MAGIC online database and BMERC. Three non-statutory Milton Keynes Wildlife Corridors (MKWCs) pertain to the Development Site however, and these are described in Section F4.5 below.

Statutory designated areas

F4.3 There are no internationally protected areas (Special Protection Areas (SPAs), Special Areas of Conservation (SACs) or Ramsar sites) or Sites of Special Scientific Interest (SSSIs) within 10km of the Development Site and no other nationally protected areas (National Nature Reserves (NNRs) or Local Nature Reserves (LNRs) within 5km of the Development Site.

F4.4 Impact Risk Zones (IRZs) are used by Natural England to identify development activities in the vicinity of SSSIs, SPAs and SACs which in the absence of avoidance or mitigation measures may adversely affect designated features, thereby requiring planning authorities to consult with Natural England where potentially damaging activities are proposed. No IRZs relate to the Development Site, and as such Natural England would not be expected to be consulted on development proposals for development at the Development Site in this regard.

Non-statutory designated areas

F4.5 Three MKWCs pertain to the Development Site. These represent linear pathways of habitats that encourage movement of plants and animals between other important habitats and are treated in the same way as Local Wildlife Sites (LWSs) in Milton Keynes. These are the only non-statutory designated areas pertaining to the Development Site and are described below:

1 The M1 motorway which passes through the south-western corner of the Development Site;

2 The River Ouzel which flows northward through the western and central parts of the Development Site; and

3 The Broughton Brook which flows northward through the south-western corner of the Development Site to its confluence with the River Ouzel.

F4.6 Where development proposals lie within or adjoining a MKWC, the Council will need to be consulted in order for them to consider whether the proposals would damage the viability of the Corridor.

F4.7 One former Biological Notification Site (BNS), namely Wood South of Wepener BNS, was identified within the Development Site during an initial desk study conducted in 2008 [Ref 28]. The area is located in the north of the Development Site to the east of the A509 and was described as a former brickpit with old mature Oak trees interspersed with ponds. More recent desk studies have not identified this area as a BNS and it appears that the area has been deregistered.

F4.8 Other non-statutory designated areas within the ZOI include three LWSs and 13 BNSs. These are detailed in Table F4.1 below:

Table F4.1 Non-statutory designated sites within the ZOI

Site Name	Site Code	Grid Ref	Direction and distance from site at closest point (approx.)	Description
Willen Lake LWS	84Q04	SP878403	83m west	Supports UKBAP Priority Habitats including lowland meadow and open water with associated habitats of swamp, tall-herb fen and flowing water. The site is also noted for its bird populations and the presence of the endangered plant Grass-poly.
Broughton Fields, Pond 1 BNS	94A03	SP913404	691m south-east	Small pond, less than 20 sq. yards. Not shaded.
Tongwell Lake LWS	84R01	SP867423	847m north-west	Lake habitat with fringing aquatic vegetation, woodland and amenity grassland, noted for its wintering birds.
Chicheley Brook, Hill Farm BNS	94C05	SP904440	945m north-east	Good score for water quality based on invertebrate species.
Newport Pagnell, Gravel Pits BNS	84X01	SP884447	1.10km north	A series of several disused gravel pits filled with water.
Bridge south of Newport Pagnell BNS	84R05	SP877438	1.29km north-west	Large river.
Moulsoe Old Wood, Pond and Scrub BNS	94B02	SP919421	1.41km north-east	Large pond completely surrounded by bushes. Also a smaller pond present.
Moulsoe Old Wood BNS	94G01	SP922424	1.45km north-east	North third coniferised and remainder young mixed plantation/ coppice. Large central clearing. Rides colourful wide meadows, only central strip close mown. Extensive old Blackthorn thickets in west & fine blackthorn hedge on western & southern boundaries. Butterfly potential.
Grand Union Canal, Downhead Park BNS	84Q03	SP868403	1.52km west	Canal.
Grand Union Canal, Great Linford BNS	84Q07	SP860422	1.64km north-east	Canal.
Grand Union Canal, Woolstone BNS	83U12	SP871390	1.69km south-west	Canal.

Site Name	Site Code	Grid Ref	Direction and distance from site at closest point (approx.)	Description
Wet area south side of Lathbury Park BNS	84S08	SP875445	2.01km north-west	No description available.
Sherington Bridge BNS	84X05	SP884453	2.13km north-west	Large river.
A509 Verge East of Sherington LWS	84Y05	SP896457	2.34km north	Both sides of the roadside verge are rough neutral grassland with scattered scrub and a remnant of ancient woodland is present.
Great Linford Gravel Pits BNS	84L01	SP848433	2.66km north-west	A series of lakes and ponds formed from old gravel-workings. Some lakes well-vegetated with a range of wildlife. Well-used by waterfowl and waders, especially in winter. Surrounding grassland and ditch has variety of plant species.
Great Linford BNS	84L07	SP851423	2.67km north-west	Old quarry pond with Great Crested Newt (1984).

F4.9 Ten areas of woodland included on Natural England's Inventory of Ancient Woodland are located within 2km of the Development Site, none of which are however located within or adjacent to the Development Site. Ancient Woodland is land that has had a continuous woodland cover since at least 1600AD and has only been cleared for underwood or timber production. It can be placed into two categories:

1 Ancient semi-natural woodland – woodland that retains a native tree and shrub cover that has not been planted.

2 Ancient replanted woodland – woodland where the original tree cover has been felled and replaced by planting, often with conifers and usually this century.

F4.10 Locations and, where available, citation documents for the designated areas in the vicinity of the Development Site are included in Appendix F3 (Volume 2 to this ES).

Field surveys

F4.11 The findings of the ecological surveys carried out in support of this assessment indicate that, with the exception of the MKWCs described above, the Development Site is unlikely to qualify, either wholly or in part, as a statutory or non-statutory designated site on the basis of its nature conservation interest.

Habitats

Desk study

F4.12 Seven areas of deciduous woodland BAP Priority Habitat/ Habitat of Principal Importance listed under Section 41 of the 2006 NERC Act have been identified either within or immediately adjacent to the Development Site boundary from the MAGIC online database. These include:

F4.13 A strip of woodland along the River Ouzel in the north-west of the Development Site;

1 A block of woodland in the north of the Development Site to the east of the A509 (corresponding with the area formerly identified as Wood South of Wepener BNS (see Section F4.7 above);

2 Woodland blocks linked together over two field boundaries to the west of Hermitage Farm in the south-west of the Development Site;

3 A series of four woodland blocks associated with the M1 and Tongwell Street in the southwest of the Development Site.

F4.14 A plan showing the locations of the above woodlands is provided in Appendix F3 (Volume 2 to this ES). No further BAP Priority Habitats/ Habitats of Principal Importance were identified within or immediately adjacent to the Development Site during the desk study.

Field surveys

F4.15 The results of the Phase 1 habitat survey are presented in map form on Figure F2 (Volume 2 to this ES). A brief non-technical description of the Development Site's habitats and features is given below. Numbers in brackets refer to the Target Note descriptions for each area provided in Appendix F2(Volume 2 to this ES).

F4.16 In general terms, the Development Site is dominated by a series of arable fields bordered by hedgerows, treelines, ditches and fencing. Other habitats include grazed grassland fields, small areas of amenity grassland and small pockets of deciduous woodland. The River Ouzel and its tributary, the Broughton Brook, flow in a northerly direction through the western and central area of the Development Site and, associated with these watercourses, the Pineham Nature Reserve in the south of the Development Site supports a mosaic of scrub, rough grassland, tall ruderal vegetation and ponds.

F4.17 Other features within the Development Site include a small number of agricultural, commercial and residential buildings, generally associated with working farms, the M1 motorway which passes through the south-west corner of the Development Site through a corridor of woodland, scattered trees and scrub, and several smaller roads intersecting the Development Site elsewhere.

Woodland

F4.18 Small areas of woodland are present in several places across the Development Site:

Semi-natural broadleaved woodland

F4.19 The most substantial area of semi-natural broadleaved woodland within the Development Site is located close to the Moulsoe buildings to the east of the A509 (115). This area is an old brickpit which was formerly designated as a BNS but appears to have been deregistered in recent years (see Section F4.7 above). The woodland present currently comprises a mix of mature and early-mature regenerated trees with some additional planting. Occasional mature Pedunculate Oak trees occur predominantly around the northern and eastern edges and a mix of other species is present including Rowan, Poplar, White Willow, Beech, Wild Cherry, Norway Maple, Scot's Pine, *Prunus* sp., Lilac, Boxelder Maple, Elder and Goat Willow. Although a permanent pond is present close to the woodland (118, see Section F4.41), patches of seasonal standing water are also present throughout (116).

F4.20 Smaller copses of semi-natural broadleaved woodland are present on field boundaries, particularly in the north and east of the Development Site (111, 139, 147, 156, 158), and these are generally located at the convergence of multiple hedgerows. Dominant species within these areas include English Elm, Elder, Norway Maple and Ash and mature Oak trees are present in

places. The understorey of these areas is typically sparse and dominated by Bramble and Common Nettle.

Plantation woodland

F4.21 Small areas of plantation woodland are present on field boundaries, primarily within the southern and eastern areas of the Development Site (14, 39, 43, 50, 64, 74, 83, 105, 134, 219). These areas comprise a mix of early-mature and young trees of native and non-native species, typically including Pedunculate Oak, Norway Maple, Scot's Pine, Sycamore, Horse Chestnut, Wild Cherry and Poplar with frequent Common Nettle and Bramble below

F4.22 More substantial areas of landscape planting are present in the south-west of the Development Site in association with the M1 and Tongwell Street (1, 2, 11). These areas typically include a mix of early-mature trees including Silver Birch, Alder, Wild Cherry, Poplar and Scot's Pine with a mixed understorey.

Scattered trees

F4.23 No ancient, or potentially ancient, trees have been identified within the Development Site.

F4.24 A number of mature trees across the Development Site support veteran features and in the absence of definitive guidance for establishing veteran status in the context of the NPPF [Ref 17] and Natural England Standing Advice [Ref 18], a precautionary approach has been taken in this assessment and a total of 40 individual trees and two woodland groups are treated as 'veteran' trees in the context of the NPPF, pending review at an appropriate stage. These trees are described as 'potential veteran' trees in this chapter and are widespread across the Development Site, generally occurring within hedgerows and woodland pockets. The locations of all the potential veteran trees within the Development Site are identified within the Tree Survey Report and Arboricultural Impact Assessment (Appendix C6 at Volume 2 to this ES).

F4.25 The majority of scattered trees within the Development Site are associated with hedgerows and ditches along field margins, these include several mature and potential veterans as well as younger trees. Species present are commonly Ash, Pedunculate Oak, Norway Maple, Wild Cherry and Scot's Pine, (47, 73, 123, 125, 160) while Crack Willow, White Willow and hybrid Black Poplar also occur frequently in low-lying areas associated with the River Ouzel and tributary streams (26, 127, 30, 33, 129, 156, 137, 251).

F4.26 Other tree groups with a generally more mixed species composition occur in association with the farms and include domestic Apple and Plum trees, including a potential veteran Apple tree near Hermitage Farm in the south-east of the Development Site, and a mix of planted ornamental species (69, 70, 77, 119, 165).

Hedgerows

F4.27 The majority of field boundaries at the Development Site are formed by hedgerows. These are mostly intact and frequently species-poor, although many species-rich hedgerows occur, particularly within the central parts of the Development Site to the east of the A509. In general, the hedgerows are dominated by Hawthorn and/or Blackthorn with other species less frequently recorded including Elder, Bramble, English Elm, Field Maple, Goat Willow, Crab Apple, Oak, Ash, Crack Willow, Guelder Rose, Dog-rose, Yew, Wild Cherry, Birch and Crab Apple. A number of the hedgerows have associated dry or seasonally wet ditches along their length and these are described further below. Trees occur along many of the hedgerows and include Ash, Pedunculate Oak, Norway Maple, Wild Cherry and Scot's Pine.

F4.28 An exception to the hedgerows described above, is a line of close-planted early-mature Cypress trees around 15m in height, which form a hedgerow in the centre of the Development Site alongside the adjacent hotel grounds (171).

F4.29 A total of 64 of the hedgerow sections within the Development Site meet criteria for consideration as 'important' under Paragraphs 1-5 Historical and Archaeological Criteria of the 1997 Hedgerow Regulations [Ref 8] and 35 hedgerow sections meet criteria for consideration as 'important' under Paragraphs 6-10 Wildlife and Landscape Criteria. Further information relating to each hedgerow is provided in Appendix F4 (Volume 2 to this ES).

Scrub and tall ruderal vegetation

F4.30 Small patches of unmanaged dense and scattered scrub are present across the Development Site in association with ditches and field margins and typically include Hawthorn, Blackthorn, Elder, Goat Willow and Bramble (16, 17, 80, 119, 153, 21, 47, 66, 142, 160). These areas are generally unmanaged but prevented from expansion through management of adjacent agricultural fields.

F4.31 The Pineham Nature Reserve in the south of the Development Site comprises a mosaic of scrub, scattered trees and tall ruderal vegetation/ rough grassland associated with a former BMX track alongside the River Ouzel and Broughton Brook (244, 247).

F4.32 Stands of tall ruderal vegetation are located across the Development Site in association with grassland and arable field margins (32, 58, 60, 82, 119, 143, 152 and 168), ditches (21, 30, 31, 48, 54, 148 and 167), along the stream and river corridors (26, 107 and 127), below hedgerows (13 and 17) and within farmyards (117). Species most commonly recorded include Common Nettle, Creeping Thistle, Bristly Ox-tongue, Hogweed, Hemlock, Burdock, Teasel, Great Willowherb and Hoary Willowherb.

Grassland

F4.33 A series of cattle-grazed fields lie adjacent to the western bank of the River Ouzel (174, 175, 176, 177). These include a series of four small fields with evidence of historical ridge and furrow management in the south, currently supporting fairly intensively managed species-poor semi-improved grassland with a high proportion of Perennial Ryegrass and low forb cover.

F4.34 To the north of these is a series of larger fields of higher species-richness (173, 253) which appear to be managed by cutting for hay with aftermath grazing. Notwithstanding this, the focussed Phase 2 botanical survey of the southern and central of these fields found the botanical interest of the grassland to be fairly limited, with the grassland being classified as 'Species-poor Semi-Natural' grassland. Although the grassland does not qualify for consideration as a BAP Priority Habitat or a 2006 NERC Act Habitat of Principal Importance, it has some characteristics of the MG4 *Alopercus pratensis - Sanguisorba officinalis* grassland community albeit not a high-quality representative of this grassland type. Details of the Phase 2 botanical survey and further descriptions of these grasslands are provided in Appendix F5 (Volume 2 to this ES).

F4.35 Grassland habitats to the east of the River Ouzel are generally restricted to narrow arable field margins or areas of grazed pasture (77, 90, 119, 131, 144, 150, 168) which comprise generally species-poor agriculturally improved grassland dominated by coarse grasses. Small patches of intensively managed and species-poor amenity grassland are also present in association with the farms (4, 65, 69, 76, 90, 113, 168) and in the Parks Trust managed land adjacent to Tongwell Street (225).

Arable

F4.36 The site is dominated by intensively farmed large arable fields, primarily cultivated for cereal production (13, 35, 41, 45, 53, 101 and 121). Arable weeds are rare, however scattered ruderal species are occasionally present and include Cleavers, Field Speedwell, Bristly Ox-tongue, Sowthistle and Scentless Mayweed (13). Field margins are generally narrow (ranging from 2-3m in width, rarely up to 6m) and support common and widespread coarse grassland species although species-richness tends to increase slightly towards hedgerow bases.

Rivers and streams

1 River Ouzel

F4.37 The River Ouzel flows in a northerly direction through the western and central area of the Development Site (6, 26, 127, 246). The river channel is up to approximately 10m wide and estimated to be over 1m deep with a soft silt base. The river banks, in particular the western bank, are densely vegetated with rough grassland, tall ruderals and marginal vegetation that encroaches into the channel. Species present include Common Nettle, Himalayan Balsam, Hogweed, Yellow Frag Iris, Water Lilies, Bindweed, Willowherb, Arrow-head, Bullrush, Spike Rush and Hard Rush. Willow and Hawthorn scrub is also scattered along the banks, in particular along the eastern bank, creating densely shaded areas with limited bankside vegetation.

2 Broughton Brook

F4.38 The Broughton Brook flows northwards through the south west of the Development Site (136, 245, 248) before flowing into the River Ouzel. The brook has a 4-5m wide channel and a strong northerly flow. The eastern bank comprises grasses and abundant Common Nettle while the western bank within the Pineham Nature Reserve comprises rough grass and scrub. The channel itself supports abundant Reed Canary-grass and Common Club Rush.

F4.39 The River Ouzel and Broughton Brook corridors form locally-designated MKWCs as discussed in Section F4.5 above.

3 Streams

F4.40 A small un-named stream flows westwards into the River Ouzel in the eastern area of the Development Site. The steeply sided channel measures around 1.5-2m deep and 3-4m wide. Although seasonally dry, the flow of water is often strong during times of wetter weather. The bankside vegetation includes grasses and ruderal vegetation such as Great Willowherb and Fool's Watercress is present within the channel in places.

4 Ponds

F4.41 A number of small ponds are present within the Pineham Nature Reserve in the south of the Development Site (244, 257). These comprise a mix of shallow ephemeral and more permanent waterbodies set within an area of largely unmanaged rough grassland, tall ruderals and scrub. Detailed descriptions of the ponds within the Pineham Nature Reserve are provided in Appendix F16 (Great Crested Newt HSI and eDNA Survey Report) (Volume 2 to this ES).

F4.42 Elsewhere within the Development Site the largest pond within the Development Site is located on a field margin in the south of the Development Site adjacent to Newport Road and measures approximately 600m^2 (66). Several smaller ponds are present elsewhere across the Development Site to the north of the M1, these are generally associated with patches of scrub or woodland on field boundaries (75, 125, 160). A further pond located at the edge of a farmyard in the north of the Development Site (118) is heavily polluted from farmyard runoff. The majority

of these ponds dry out on a seasonal basis and/ or are heavily shaded by surrounding vegetation and as such they generally support limited or no aquatic or marginal vegetation.

F4.43 To the south of the M1, two small recently established ponds are located within an area of amenity grassland bordering Tongwell Street (226). A third pond is located to the west of these below the Tongwell Street bridge over the River Ouzel (222), this has shallow earth banks and is known to be seasonally dry.

Ditches

F4.44 Two well-vegetated ditches are located on the boundaries of the grassland fields in the western area of the Development Site (30, 33). These ditches are 2-3m wide, largely unshaded and support dense marginal vegetation dominated by Reed Canary-grass and Common Reed.

F4.45 Smaller seasonal ditches are also present across the Development Site in association with hedgerows along field boundaries (21, 24, 27, 28, 31 and 40) and within the Parks Trust managed land to the south of the M1 (227). The channels of these ditches vary slightly in width ranging between 2m and 4m wide with a typical depth of approximately 1-1.5m. Vegetation within the ditches mostly comprises tall ruderal vegetation and Bramble scrub.

F4.46 Dry ditches are also present across the Development Site in association with hedgerows and tree lines (29, 34, 36, 42, 44, 46, 48-51, 54-57, 59, 61-62, 67, 72, 78-79, 81, 86, 88, 93-100, 104, 112, 120, 122, 126, 140, 141, 145-146, 148, 153-155, 159 and 161-165, 167). The channels of the dry ditches are shallow, generally no more than 1m deep, some of which are overgrown with Bramble scrub and tall ruderal vegetation with species including Common Nettle, Great Willowherb and Cleavers.

Buildings, hardstanding and open ground

F4.47 A number of agricultural and residential buildings are present across and adjacent to the Development Site (76, 92, 113, 117, 143, 158, 169, 175). Areas of hardstanding are present across the Development Site, often in association with these buildings (117, 143 and 169), the M1 and smaller roads, and tracks running through the Development Site (69, 87, 114, 142 and 146).

Bats

Desk study

F4.48 BMERC provided 53 records of bats for the desk study area including Daubenton's, Natterer's, Noctule, Common Pipistrelle, Soprano Pipistrelle and Brown Long-eared bats together with unidentified species of *Pipistrellus* and *Plecotus*. Two records pertain to a location immediately adjacent to the northern site boundary and relate to Natterer's bats, dating from 1992.

F4.49 In addition, a review of granted European Protected Species applications listed on the MAGIC online database shows one licence for Brown Long-eared bat, dating from 2010, located approximately 2km to the west of the Development Site.

F4.50 Highways England have also provided data from 2016 of a known Daubenton's maternity roost associated with three M1 road bridges over the River Ouzel and its tributaries, two of which are located within the Development Site and one of which is located immediately adjacent to the Development Site [Ref 11].

Field survey

F4.51 In addition to the Daubenton's roost sites described above, a number of additional confirmed and probable bat roosts were identified within individual trees (T), tree groups (G), and

buildings (B) within and adjacent to the Development Site during the Phase 2 bat roost survey work. These are:

1 Confirmed occasional/transitory roosts for individual Common Pipistrelle bats within B2, B3, B27, T18, T25 and T29;

2 Confirmed occasional/transitory roosts for two Soprano Pipistrelle, one Serotine and one *Pipistrellus* sp. bat within B33-G;

3 A possible small maternity roost for Common Pipistrelle bats within the building group B33-C, B33-G, B33-H and B33-L;

4 A confirmed occasional/transitory roost for two bats of indeterminate species in T17;

5 A confirmed day roost for an individual *Pipistrellus* sp. bat within T71;

6 A probable occasional/transitory roost for an individual bat of indeterminate species in G1; and

7 A confirmed roost for at least two Noctule bats in G3.

F4.52 No further bat roosts were identified within the Development Site however due to the timing of instruction on bat survey work it has not been possible to complete phase 2 bat surveys within the small parcels of land that were late additions to the Development Site area (discussed above in Section F3.29). In addition, it is necessary to regard the results of the Phase 2 bat surveys of B33-C, B33-F, B33-G, B33-H, B33-I, B33-L and Trees 29 and 71 as provisional as due to the timing of instruction of the surveys of these features, it was not possible to complete the requisite number of surveys in line with best practice guidance [Ref 1] prior to this assessment. These restrictions are factored into the assessment presented at Section F7 and measures to overcome these limitations are also detailed.

F4.53 In addition to the bat roosts described above, a number of other buildings and trees have been identified as having low or higher potential to support roosting bats but have not been found to support active roost sites to date. All remaining buildings and trees within the surveyed areas of the Development Site are considered to have negligible potential to support roosting bats. The locations of the confirmed and probable bat roosts, and the features having potential to support roosting bats are shown in Figure F4 (Volume 2 to this ES).

F4.54 The suite of bat activity transect, automated and dusk emergence surveys confirmed the presence of at least ten bat species using the Development Site on at least an occasional basis for foraging and commuting. The majority of activity related to relatively common and widespread species including Common Pipistrelle, Soprano Pipistrelle and Noctule bats, with *Myotis* sp., Brown Long-eared bat, Serotine and Leisler's bats also recorded at lower frequencies. The rarest species of bats recorded using the Development Site are Barbastelle, Nathusius' Pipistrelle and Greater Horseshoe bats, all of which were recorded at very low frequencies and considered to be using the Development Site as part of a much wider foraging territory.

F4.55 The areas of the Development Site with greatest concentration of bat foraging and commuting activity for all species included the River Ouzel corridor, the Pineham Nature Reserve and connected hedgerows in the west of the Development Site, with lower levels of activity recorded in association with woodland edges and hedgerows in the remainder of the Development Site (see Figure F5, Volume 2 to this ES).

F4.56 The full findings of the bat surveys conducted at the Development Site are contained in the bat survey reports included as Appendices F6 and F7 and are summarised in Figures F4 and F5 (Volume 2 to this ES).

Dormouse

Desk study

F4.57 No records of Dormouse were provided during the desk study.

Field survey

F4.58 The areas of grassland, arable land, waterbodies, hardstanding and buildings that in combination dominate the Development Site generally comprise unsuitable habitats for Dormice. Limited areas of more suitable Dormouse habitat do occur throughout the Development Site however within small pockets of broadleaved woodland, scrub and the mature hedgerow network where many of the species present produce fruits/ nuts and flowers and could support invertebrate populations of value to foraging Dormice throughout the year. The habitats within the Development Site are however somewhat isolated from any substantial areas of high-quality Dormouse habitat in the wider area.

F4.59 No Dormice or evidence of Dormice was recorded during the nest tube survey. It is therefore considered that Dormice are highly likely to be absent from the Development Site.

F4.60 The full findings of the Dormouse survey conducted at the Development Site are contained in the Dormouse Survey Report included as Appendix F8 (Volume 2 to this ES).

Otter

Desk study

F4.61 BMERC provided five records of Otter for the desk study area, the closest of which pertains to the River Ouzel in the south of the Development Site, dating from 2009.

Field survey

F4.62 The Otter survey recorded multiple signs of Otter activity along the banks of the River Ouzel in association with the site. This included a possible lying up site or holt on the northern bank of the river just outside the site approximately 50m to the west of the Tongwell Street bridge. Other signs of Otter recorded within and adjacent to the site included dried and fresh Otter spraints, tracks and potential feeding remains. The survey results suggest that Otter are routinely using the section of the River Ouzel within the site for foraging and movement. Due to the large size of home ranges typically associated with Otters (up to 40km for males and roughly half that for females) it is likely that the section of river within the site forms only a small part of a larger Otter territory. Although no evidence of Otter was recorded from any other watercourse associated with the site, it is considered likely that Otters also use the Broughton Brook on at least an occasional basis in view of the suitability of the habitat present and its connection with the River Ouzel.

F4.63 The full findings of the Otter surveys conducted at the Development Site are contained in the survey reports included as Appendices F9 and F10 and are summarised in Figure F6 (Volume 2 to this ES).

Water Vole

Desk study

F4.64 BMERC provided a single record of Water Vole for the desk study area, pertaining to a fishing lake in Great Linford approximately 2.5km to the west of the Development Site, dating from 1997.

Field survey

F4.65 Evidence of Water Voles was recorded along a ditch in the west of the Development Site during a survey conducted by HDA in 2012. During more recent surveys however the ditch has been dry and no signs of Water Vole have been recorded from any of the watercourses or waterbodies within the Development Site. The majority of ditches and ponds within the Development Site provide only suboptimal habitat for Water Voles, due to seasonal drying, limited availability of suitable food and in some cases heavy shading from bankside trees and hedgerows. The River Ouzel and Broughton Brook however appear to provide high quality Water Vole habitat and as such it is conceivable that this species may recolonise the Development Site in the future if populations remain in the wider area.

F4.66 The full findings of the Water Vole surveys conducted at the Development Site are contained in the survey reports included as Appendices F9 and F10 and are summarised in Figure F6 (all at Volume 2 to this ES).

Badger

Desk study

F4.67 BMERC provided 21 records of Badger for the desk study area. Four of these records pertain to locations within the Development Site including;

1 Two records in the central area of the Development Site dating from 2013 and 2014;

2 A record in the southern area of the Development Site dating from 2012; and

3 A record in the north of the Development Site dating from 2004.

Field survey

F4.68 The only Badger setts within the Development Site considered to be in 'current use' in the context of Natural England's 2009 guidance [Ref 19] recorded during the survey are three outlying setts. These are:

1 Sett F, located at a hedgerow base in the corner of an arable field in the centre of the Development Site;

2 Sett L, located at the edge of a ditch in an arable field margin in the south of the Development Site; and

3 Sett J2, located on a ditch in the north-west of the Development Site.

F4.69 Fourteen outlying Badger setts (Setts A, B, C, D, E, G, H, I, J, K, M, N, J1 and C1), not showing any signs of current use at the time of survey, were also recorded within the Development Site and are considered to not be in current use within the context of the 1992 Badgers Act. Other evidence of Badger, including dung pits, latrines, ground scrapings and snuffle holes, were recorded across the Development Site, particularly within woodland areas and along field margins.

F4.70 The grassland, field margins, hedgerow, scrub and woodland habitats within the Development Site provide good to moderate quality foraging habitat for Badgers however the intensively managed arable fields which dominate the Development Site offer only low quality foraging habitat. Although it is likely that that habitats across the Development Site are routinely used for foraging by the local Badger population, only a relatively low level of use by Badgers is evident and the Development Site is unlikely to be of exceptional interest for Badgers in a local context..

F4.71 The full findings of the Badger survey are contained in the survey reports included as Appendices F11 and F12 and are summarised in Figure F7 (all at Volume 2 to this ES).

Birds

Desk study

F4.72 WSBRC provided records of 126 notable bird species occurring within the desk study area. These include:

1 Twenty-eight species listed in Annex I of Council Directive 79/409/EEC on the conservation of wild birds (Arctic Tern, Avocet, Barnacle Goose, Bar-tailed Godwit, Bewick's Swan, Bittern, Black Tern, Common Tern, Dartford Warbler, Dunlin, Hen Harrier, Kingfisher, Little Gull, Little Tern, Marsh Harrier, Mediterranean Gull, Merlin, Osprey, Peregrine Falcon, Red Kite, Red-necked Phalarope, Ruff, Short-eared Owl, Slavonian Grebe, Smew, Spoonbill, Whooper Swan and Wood Sandpiper);

2 Forty-three species listed under Schedule 1 of the 1981 Wildlife and Countryside Act (as amended) (Avocet, Bewick's Swan, Bittern, Black Tern, Dartford Warbler, Hen Harrier, Kingfisher, Little Gull, Little Tern, Mediterranean Gull, Merlin, Osprey, Peregrine Falcon, Red Kite, Red-necked Phalarope, Ruff, Slavonian Grebe, Spoonbill, Whooper Swan, Wood Sandpiper, Barn Owl, Black Redstart, Black-necked Grebe, Black-tailed Godwit, Brambling, Cetti's Warbler, Common Scoter, Fieldfare, Firecrest, Garganey, Goldeneye, Green Sandpiper, Greenshank, Greylag Goose, Hobby, Little Ringed Plover, Pintail, Redwing, Scaup, Temminck's Stint, Velvet Scoter, Whimbrel and Wryneck);

3 Thirty-five species listed as Species of Principal Importance under the 2006 NERC Act (Bewick's Swan, Bittern, Hen Harrier, Black-tailed Godwit, Common Scoter, Scaup, Brent Goose, Bullfinch, Corn Bunting, Cuckoo, Curlew, Dunnock, Grasshopper Warbler, Grey Partridge, Herring Gull, House Sparrow, Lapwing, Lesser Redpoll, Lesser Spotted Woodpecker, Linnet, Marsh Tit, Reed Bunting, Ring Ouzel, Skylark, Song Thrush, Spotted Flycatcher, Starling, Tree Pipit, Tree Sparrow, Turtle Dove, White-fronted Goose, Willow Tit, Wood Warbler, Yellow Wagtail and Yellowhammer);

4 Forty-eight species on the RSPB Red List [Ref 24], i.e. generally those species whose population or range is declining rapidly; and

5 Sixty-five species on the RSPB Amber List [Ref 24], i.e. generally those declining moderately.

F4.73 A full list of bird records provided during the desk study is given in Appendix F3 (Volume 2 to this ES).

Field survey

Breeding bird survey

F4.74 A total of 54 bird species was recorded from the Development Site during the breeding bird survey, of which 39 are considered to be either breeding within the Development Site or hold a significant proportion of a breeding territory in association with the Development Site.

F4.75 Although Red Kite (included on Schedule 1 of the Wildlife and Countryside Act 1981 and Annex 1 of the EU Birds Directive) were recorded foraging over the Development Site during the survey and are likely to be breeding in the wider area beyond the boundaries of the Development Site, this species is not considered to have been nesting within or immediately adjacent to the Development Site during the breeding bird survey. The only other species included on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) which is considered to hold a significant breeding territory within the Development Site was Barn Owl. No evidence of

nesting Barn Owl was however identified within the Development Site although it is conceivable that this species is nesting within one of the buildings or trees present.

F4.76 The only other Schedule 1 bird species recorded at the Development Site during the breeding bird survey was Redwing; this species was recorded during only the first survey visit and was considered to be using the Development Site as wintering habitat only.

F4.77 Thirteen of the species recorded breeding or holding a significant portion of a breeding territory within the Development Site are currently included in the Birds of Conservation Concern (BoCC) Red or Amber lists [Ref 24]. These are:

1 Red list species: Lapwing, Skylark, Starling, Song Thrush, House Sparrow, Yellow Wagtail, Linnet and Yellowhammer.

2 Amber list species: Mute Swan, Mallard, Dunnock, Bullfinch and Reed Bunting.

F4.78 Skylark, Linnet, Yellowhammer, Reed Bunting, Yellow Wagtail, Starling, Dunnock, House Sparrow, Bullfinch, Song Thrush and Lapwing are listed as priority species on the UKBAP and as Species of Principal Importance under Section 41 of the 2006 NERC Act. This makes them a material consideration in the planning process.

Wintering bird survey

F4.79 A total of 58 bird species was recorded from the Development Site during the wintering bird survey, of which 55 were recorded directly from habitat associated with the Development Site (rather than simply flying over).

F4.80 Two species included on Annex 1 of the EU Birds Directive were recorded during the wintering bird survey, namely Red Kite and Kingfisher. The site was also found to support two further species receiving special protection under Schedule 1 of the Wildlife and Countryside Act 1981 as rare breeders: Fieldfare and Redwing. It is considered extremely unlikely however that any of these species are breeding on the Development Site, as supported by the findings of the breeding bird survey.

F4.81 Twenty-three of the species recorded wintering at the Development Site are included in the BoCC Red or Amber lists [Ref 24]. These are:

1 Red list species: Lapwing, Woodcock, Skylark, Starling, Fieldfare, Song Thrush, Redwing, Mistle Thrush, House Sparrow, Linnet and Yellowhammer.

2 Amber list species: Mute Swan, Greylag Goose, Mallard, Snipe, Black-headed Gull, Stock Dove, Kingfisher, Kestrel, Willow Warbler, Dunnock, Bullfinch and Reed Bunting.

F4.82 Lapwing, Skylark, Starling, Song Thrush, Dunnock, House Sparrow, Bullfinch, Linnet, Yellowhammer and Reed Bunting are also listed as priority species on the UKBAP/ Species of Principal Importance under Section 41 of the 2006 NERC Act.

Summary

F4.83 Of all the birds considered to be using the Development Site the species of greatest nature conservation interest is Yellow Wagtail, a migratory species which breeds in the UK. At least two breeding pairs were identified within arable fields in the western and central parts of the Development Site, accounting for approximately 0.013% of the British population of this species. Yellow Wagtails are associated with wet meadows, grazing marshes and river valleys as well as arable fields.

F4.84 The site also supports a relatively large number of breeding territories for Skylark, Linnet and Yellowhammer which are associated with the open farmland and hedgerow habitats across the Development Site.

F4.85 The site is dominated by intensively farmed arable habitats which in general are of relatively low value to breeding birds, and habitats of higher ornithological interest including woodland, hedgerows, scattered mature trees, grassland, scrub and wetland (river) are often limited in extent and restricted to field boundaries or have interfaces with off-site habitats. The habitats provided by the Development Site are however abundant in the wider area and, with the exception of Yellow Wagtail, all species recorded breeding or wintering at the Development Site are generally relatively common and widespread in Britain, with the Development Site supporting only a very small proportion of the British breeding or wintering population of any one species. The site does not meet the requisite score for qualification as a candidate SPA or SSSI and is highly unlikely to qualify, either wholly or in part, as a LWS.

F4.86 The full results of the breeding and wintering bird surveys are presented in the Wintering and Breeding Bird Assessment Report included as Appendix F13 (Volume 2 to this ES).

Reptiles

Desk study

F4.87 BMERC provided seven records of Grass Snake for the desk study area. The closest record to the Development Site relates to an area of woodland within the southern part of the Development Site to the south of the M1.

Field survey

F4.88 The most recent reptile surveys of the Development Site recorded very low populations of Grass Snake and Slow-worm within the vicinity of the Development Site, with low numbers of Grass Snakes recorded in rough grassland field margins/ hedgerow bases within and close to the south-eastern corner of the Development Site and Slow -worm recorded at a hedgerow base in the central southern part of the Development Site. A previous reptile survey of the Development Site conducted in 2012 however revealed Grass Snake to be more widespread across the Development Site, albeit still in low numbers, with records also being made in field margins in the north and west.

F4.89 Although the majority of the Development Site comprises unsuitable reptile habitat, being dominated by intensively managed farmland, limited areas of suitable reptile habitat are widespread throughout the Development Site in the form of woodland edges, hedgerow bases, riparian habitats and the network of field margins of rough grassland, ditch, tall ruderal vegetation and scrub habitats. As such it is conceivable that both Grass Snake and Slow-worm occur in very low numbers in areas of suitable habitat throughout the Development Site.

F4.90 In view of the low numbers of reptiles recorded at the Development Site however, and the abundance of similar and higher quality habitat available in the wider area, the Development Site is unlikely to be of exceptional interest for reptiles in a local context.

F4.91 The full results of the reptile survey are contained in the survey reports included as Appendices F14 and F15 and are summarised in Figure F8 (all at Volume 2 to this ES).

Great Crested Newts

Desk study

F4.92 BMERC provided 136 records of Great Crested Newt for the desk study area and, in addition, Highways England have provided data of Great Crested Newt surveys conducted within the vicinity of the Development Site in 2016 in relation to the M1 Junction 13 to 16 works. The desk study results included the following records of Great Crested Newts from ponds within 300m of the Development Site:

1 Medium and small populations of Great Crested Newt in four on-site ponds located within the Pineham Nature Reserve in the south of the site, dating from 2016;

2 A small population of Great Crested Newt within an on-site pond located below the Tongwell Street bridge in the south of the site (Waterbody 19A), dating from 2016;

3 Presence of Great Crested Newt within an on-site pond located within the Parks Trust land in the south of the site, dating from 2016 (Waterbody 22);

4 Presence of Great Crested Newt within at least 4 off-site ponds located at Cotton Valley Sewage Works within 50m of the site boundary along Tongwell Street (Waterbodies 24-27) dating from 2010 and 2016;

5 Presence of Great Crested Newt within a pond (Waterbody 14A) located 65m from the south-western site boundary, dating from 2003; and

F4.93 A small population of Great Crested Newt within an off-site pond located 245m to the south-west of the site boundary (Waterbody 20), dating from 2016.

Field survey

F4.94 Great Crested Newt surveys conducted by HDA in 2019 and 2020 have identified the following ponds supporting Great Crested Newts within 300m of the Development Site:

1 A low-end moderate population of Great Crested Newt within 9 ponds at Pineham Nature Reserve in the south of the Development Site (Waterbodies 2, 3, 4, 5, 8, 9, 10, 11 and 13); and

2 A very low population of Great Crested Newt within a pond (Waterbody 14A) located approximately 65m from the south-western site boundary.

F4.95 As discussed in Section F3.30 above, due to changes to the Development Site boundary and highways proposals after the Great Crested Newt survey work was undertaken and seasonal constraints relating to the timing of Great Crested Newt surveys preventing this work being undertaken prior to this assessment, it has not been possible to conduct exhaustive surveys of all of ponds in the vicinity of Tongwell Street to the south of the M1 in advance of this assessment.

F4.96 In view of the above, and the presence of Great Crested Newts identified within a number of these ponds during the desk study, for those ponds in the vicinity of Tongwell Street where full surveys have not been undertaken by HDA in 2019 and 2020 it is assumed that these ponds support high populations of Great Crested Newts, whether or not these have been identified as supporting Great Crested Newts during previous surveys. This assumption relates to the following waterbodies:

1 Ponds located within Cotton Valley Sewage Works (Waterbodies 23-27) where Great Crested Newts have previously been recorded;

2 Pond previously recorded as supporting Great Crested Newts in the Parks Trust Land to the south of the M1 (Waterbody 22), and below Tongwell Street bridge (Waterbody 19A);

3 An off-site pond located 245m to the south-west of the site boundary (Waterbody 20) previously recorded as supporting Great Crested Newt; and

4 A recently created pond in the Parks Trust Land to the east of Tongwell Street not previously subject to survey (Waterbody 21).

F4.97 This presents a worst-case scenario for the likely effects of the Proposed Development on the local Great Crested Newt population.

F4.98 The southern and western areas of the Development Site, located within 250m (the typical migratory range of newts) of the known and assumed populations of Great Crested Newts, include extensive areas of scrub and rough grassland within Pineham Nature Reserve and the Parks Trust Land which provide high quality terrestrial habitat for Great Crested Newts. The remainder of the range area within the Development Site is dominated by arable land, grazed semi-improved grassland fields, roads and managed grassland which provide limited opportunities for Great Crested Newts during terrestrial phases. These are however complemented by a network of hedgerows, scattered trees, rough grassland/ tall ruderal field margins and small areas of broadleaved woodland which provide moderate to high quality habitat for terrestrial phase newts. It is therefore likely that Great Crested Newts associated with known and assumed populations use suitable areas of the Development Site during terrestrial phases.

F4.99 The full results of the Great Crested Newt surveys conducted by HDA in relation to the Development Site are contained in the survey reports included as Appendices F16 and F17 and are summarised in Figure F9 (all at Volume 2 to this ES).

Invertebrates

Desk study

F4.100 A total of 355 records of invertebrate species were received for the desk study area. These include a number of species with a limited distribution included on Nationally Notable and Red Data lists, none of which pertain to the Development Site.

F4.101 The only records of protected invertebrates provided for the desk study area relate to Black Hairstreak and White-letter Hairstreak butterflies, both of which are protected under Schedule 5 of the 1981 Wildlife and Countryside Act (as amended) against commercial exploitation. In addition, White-letter Hairstreak is a UKBAP species and 2006 NERC Act Species of Principal Importance.

Field survey

F4.102 The Invertebrate Survey found that the vast majority of the Development Site, notably the arable fields and pastures, comprises habitat of low invertebrate interest.

F4.103 Habitats of higher interest for invertebrates include an area of woodland in the north of the Development Site, mature trees within hedgerows across the Development Site, and riparian bankside habitat along the River Ouzel. In combination, across the Development Site these habitats are considered as a whole to support invertebrate assemblages of District and potentially County value, as:

1 The site supports a diverse invertebrate fauna, which returned over 400 terrestrial and aquatic species from surveys undertaken between 2018 and 2019.

2 Nineteen species were sampled with recognised conservation status.

3 The Specific Assemblage Type - rich flower resource - was recognised by the Pantheon tool, indicating that this assemblage type (represented by flower rich field and river bank margins) is of importance. At a broader level of detail, the 'Marshland', 'Arboreal' and 'Decaying Wood' habitats have moderately high Species Quality Index (SQI) scores, indicating a relatively high proportion of scarce and rare species associated with these habitats; which were best represented in the block of mature woodland in the north of the Development Site, in association with over mature and potential veteran trees within hedgerows, and along the riparian bankside habitat of the River Ouzel.

4 The aquatic habitat of the River Ouzel and Broughton Brook had fair to good biological water quality, and included the Near Threatened species – *Gomphus vulgatissimus* – a species associated with rivers of good water quality.

F4.104 The full findings of the invertebrate survey are provided in the Invertebrate Survey Report, included as Appendix F18 (Volume 2 to this ES).

Plants

Desk study

F4.105 Sixty-six records of notable plant species were provided for the desk study area, the only one of which relating to the Development Site was for the 'County Rare' Grey Clubrush *Schoenoplectus tabernaemontani* within Pineham Nature Reserve dating from 2016. The only records of protected plants in the wider desk study area relate to species included on Schedule 8 of the 1981 Wildlife and Countryside Act (as amended): these include Grass-poly, which is protected against intentional picking, uprooting or destruction and commercial exploitation; and Bluebell, which is protected against commercial exploitation only. Other notable plant records relate to Species of Principal Importance under Section 41 of the 2006 NERC Act, and Nationally Rare and Nationally Scarce species listed on the Vascular Plant Red Data List for Great Britain [Ref 5], and generally pertain to nearby non-statutory designated areas.

Field survey

F4.106 Himalayan Balsam has been recorded along the River Ouzel corridor within the Development Site and Rhododendron is present in the north of the Development Site. Himalayan Balsam *Impatiens glandulifera*, Common Rhododendron *ponticum* and hybrid species *Rhododendron ponticum* x *maximum*, are all non-native invasive species included on Schedule 9 of the 1981 Wildlife and Countryside Act (as amended). It is an offence to release, plant or cause to grow in the wild any plant included on this schedule of the Act.

F4.107 Other than the potential veteran trees described above at Section F4.23, no protected, rare and/or notable plants were identified during the extended Phase 1 habitat survey or suite of other field surveys carried out at the Development Site.

Future Baseline

F4.108 The majority of the baseline conditions identified above are maintained through ongoing management of the Development Site. With the continued implementation of current management practices, it is not expected that the ecological character of the Development Site would change significantly over the next ten years.

F5.0 Effect Characterisation and Identification of Ecological Receptors

Identification of 'Key Ecological Receptors' and 'Other Ecological Receptors' Requiring Consideration

F5.1 Ecological receptors within the potential ZoI have been evaluated, and a value assigned to each at a given geographical scale.

F5.2 Table F5.11 summarises the evaluation of these receptors, in addition to relevant policies and legislation.

F5.3 'Key Ecological Receptors' are those having potential to be significantly affected by the Proposed Development in a manner that has material implications in the EIA decision-making process in the absence of any effect avoidance, reduction, mitigation or compensation measures. The potential effects of the Proposed Development on the ecological receptors for consideration in the EcIA are then identified in Table F5.2. The following sub-sections provide the rationale for determining key ecological receptors on the basis of both value and potentially significant effects outlined in the tables. Other important ecological receptors recognised for their nature conservation value at a local level are also identified where negative effects might occur that require avoidance and mitigation measures in keeping with nature conservation legislation and planning policy and guidance, along with those receptors requiring mitigation for legislative or policy reasons. Those which have been scoped out of the remainder of the assessment (identified as being of no or negligible nature conservation value at a local level) are also identified.

F5.4 Section F7 provides a detailed impact assessment for each of the Key Ecological Receptors listed in Section F5.4 below. For each receptor, the assessment of effects is followed by details of effect avoidance, reduction, mitigation and compensation measures. An assessment of any residual effects following implementation of the specified mitigation is also provided. Ecological enhancements relevant to the expected long-term status of key ecological receptors are also discussed here. This receptor-by-receptor approach to reporting of effects, mitigation and residual effects is a deviation from the structure of other chapters in this Environmental Statement, but has been employed for convenience to the reader given the number of ecological receptors, each having their own considerations. Effects on other receptors are discussed later in the same section.

F5.5

Table F5.1 Evaluation, conservation status, policy and legislative considerations for ecological receptors potentially affected by the Proposed Development

Ecological receptor	Value	Reasons for evaluation	Recognised conservation status	Relevant policies	Legislation
River Ouzel and Broughton Brook MKWCs and the Pineham Nature Reserve	District	The MKWCs are non-statutory designated sites of nature conservation importance at a District level. The river corridors comprise relatively uninterrupted corridors of semi-natural habitat and form part of a wider habitat network extending to the north and south of the Development Site. The rivers qualify as Habitats of Principal Importance under Section 41 of the NERC Act 2006 and support a range of protected and notable species including Otter, bats, birds, Great Crested Newt, invertebrates and notable plant species. Although the Pineham Nature Reserve is not subject of a designation in its own right, it falls within the River Ouzel and Broughton Brook MKWCs, being located between the two watercourses. As well as forming part of the wider corridors, the wetland/ scrub/ rough grassland mosaic provide habitat for a range of species (including Great Crested Newts, birds and invertebrates) and are of notable nature conservation value in their own right.	UKBAP; LBAP; MKWC	NPPF; NE1; NE3; NE4	NERC 2006
M1 MKWC	District	Site of nature conservation importance at a District level. Within the Development Site the M1 MKWC comprises road margins of woodland, scrub, scattered trees and immediately adjacent farmland habitats allowing movement along the road corridor through the Development Site and wider area for a range of species.	UKBAP; LBAP; MKWC	NPPF; NE1; NE3; NE4	NERC 2006
Other non-statutory designated sites and ancient woodlands within the ZoI	County-District	Sites of nature conservation importance at a District to County level. Includes a range of LWSs and BNSs primarily comprising wetland, woodland and grassland habitats and areas of ancient woodland in the vicinity of the Development Site.	UKBAP; LBAP; MKWC; LWS; BNS; AW	NPPF; AW & VT; NE1; NE2; NE3; NE4	NERC 2006
Network of hedgerows, ditches, scrub, treelines and scattered trees in combination	District	Many of the hedgerows within the Development Site are identified as 'important' under the Wildlife and Landscape Criteria and/ or Historical and Archaeological Criteria of the Hedgerows Regulations 1997 and qualify as Habitats of Principal Importance under Section 41 of the NERC Act 2006. Overall the network of hedgerows, ditches, scrub, treelines and scattered trees across the Development Site provides opportunities for the movement of wildlife across and around the Development Site, in addition to providing habitat of value in its own right for a range of species including bats, birds and invertebrates.	UKBAP; LBAP	NPPF; NE2; NE3; NE4	NERC 2006; Hedge Regs

Ecological receptor	Value	Reasons for evaluation	Recognised conservation status	Relevant policies	Legislation
Potential veteran trees in combination	District (low)	Several potential veteran trees are present within the Development Site, primarily in association with hedgerows and woodland pockets. These support veteran features and are of value to a range of species associated with deadwood habitats.	None	AW & VT; NE2; NE3; NE4	NERC 2006
Species-poor semi-natural neutral grassland and species-poor semi-improved grassland fields in combination	Local (moderate-high)	Floodplain grazing meadows are a declining habitat in England. Although the examples of relatively species-rich semi-improved neutral grassland within the Development Site do not qualify for consideration as a 2006 NERC Act Habitat of Principal Importance, the meadows provide habitat for a range of wildlife. The species-poor semi-improved grasslands have limited species diversity and short sward due to heavy cattle grazing. These areas are however considered in combination to be of local interest due to their extent within the Development Site, their capacity for enhancement and their provision of supportive habitat for a range of species including protected and BAP species.	None	NE3; NE4	None
Woodland parcels in combination	Local (high)	Small woodland parcels within the Development Site constitute Habitat of Principal Importance under Section 41 of the NERC Act and in addition to providing habitat for a range of species in their own right, they create a network of 'stepping stone' habitat across the Development Site and wider area.	UKBAP; LBAP	NPPF; NE2; NE3; NE4	NERC 2006
Stream in east of site and network of ponds (outside of Pineham Nature Reserve)	District	The ponds and stream provide habitat for a range of species and increase the diversity of the Development Site as well as providing stepping stones for the movement of species through the Development Site. The ponds broadly qualify as Habitats of Principal Importance under Section 41 of the NERC Act 2006 however they are of limited quality and similar and higher quality features are present in the wider area. Although the ecological value of the stream is somewhat compromised by its low water levels and intensive management which has resulted in a steeply-sided canalised channel, the stream provides connective habitat with the River Ouzel. Ponds within Pineham Nature Reserve are considered separately under the River Ouzel and Broughton Brook MKWCs above.	UKBAP; LBAP	NPPF; NE2; NE3; NE4	NERC 2006
Arable fields, arable margins and improved grassland fields in combination	Local (moderate)	The arable and improved grassland fields present are intensively cultivated with limited marginal habitats, provide few opportunities for wildlife, and no notable arable weed species have been recorded within these areas. Although of negligible interest individually, in combination these habitats are of local interest due to their extent within the Development Site and provision of habitat for farmland bird species.	UKBAP	NE3; NE4	NERC 2006

Ecological receptor	Value	Reasons for evaluation	Recognised conservation status	Relevant policies	Legislation
Bats: roosting	Local (high)	A number of roost sites are associated with individual/small numbers of roosting bats within buildings and trees across the Development Site. Mature trees and two other buildings within the Development Site also provide roosting opportunities. Similar opportunities are however abundant and widespread in the surrounding area and these are considered to be of moderate local value in combination. The Daubenton's maternity roost associated with the three M1 bridges is considered to be of moderate local value in its own right.	UKBAP	NPPF; NE2; NE3	EPS; NERC 2006; WCA
Bats: foraging and commuting	District (low)	There is low to moderate usage of the Development Site by predominantly relatively common and widespread bat species. Highest concentrations of bat activity occur in association with the River Ouzel, the Pineham Nature Reserve and associated woodland copse and hedgerow network in the west of the Development Site.	UKBAP	NPPF; NE2; NE3	EPS; NERC 2006
Dormouse	Negligible	Currently absent from site. The majority of the Development Site provides unsuitable habitat for Dormice but pockets of woodland, scrub and the mature hedgerow network present throughout the Development Site provide limited areas of more suitable habitat.	UKBAP	NPPF; NE2; NE3	EPS; NERC 2006; WCA
Otter	District	Considered to be using high quality habitats along the River Ouzel and Broughton Brook for foraging and movement as part of a larger territory extending beyond the Development Site. Riparian habitats within the Development Site provide potential holts or laying-up sites.	UKBAP	NPPF; NE2; NE3	EPS; NERC 2006; WCA
Water Vole	Negligible	Currently absent from site but was recorded at the Development Site in 2012. The River Ouzel and Broughton Brook provide good potential habitat and provide opportunities for future recolonisation of the Development Site by Water Vole.	UKBAP	NPPF; NE2; NE3	NERC 2006; WCA
Badger	Local (low)	Badger is not a species of conservation concern, but afforded legal protection. Three outlying setts in current use and 14 disused setts are present within the Development Site. Although it is likely that that habitats across the Development Site are used for routine foraging by the local Badger population, poor quality arable habitats dominate much of the Development Site and only a relatively low level of use has been recorded.	None	NPPF; NE2; NE3	PBA; WCA[6]
Birds	District (low)	The site supports a number of breeding and wintering birds of conservation concern. The site is dominated by intensively farmed arable habitats which in general are of relatively low value to breeding birds, and habitats of higher interest including woodland, hedgerows,	BOCC; (Red-listed); (Amber-listed)	NPPF; NE2; NE3	NERC 2006; WCA[1]

Ecological receptor	Value	Reasons for evaluation	Recognised conservation status	Relevant policies	Legislation
		scattered mature trees, grassland, scrub and wetland (river) are often limited in extent and restricted to field boundaries or have interfaces with off-site habitats.			
Reptiles	Local (low)	Very low populations of Grass Snake and Slow-worm were recorded and very low numbers of these species could conceivably be present throughout the Development Site where suitable habitat occurs. In view of the low numbers recorded, and the abundance of similar and higher quality habitat available in the wider area the Development Site is unlikely to be of exceptional interest for reptiles in a local context.	UKBAP	NPPF; NE2; NE3	WCA (S5)[2] NERC 2006
Great Crested Newts	District (low)	Great Crested Newts have recently been confirmed within ponds at Pineham Nature Reserve in the south of the Development Site and within a pond 65m from the south-western site boundary. In the absence of updated survey information, high populations of Great Crested Newt are also assumed within several ponds in the vicinity of Tongwell Street. Suitable terrestrial habitats are present within the Development Site and it is likely that Great Crested Newts are present where suitable terrestrial habitats occur within 250m of Great Crested Newt ponds. Great Crested Newts are however frequent in Milton Keynes and Buckinghamshire.	UKBAP	NPPF; NE2; NE3	EPS; NERC 2006; WCA
Invertebrates	District-County	The site supports a diverse terrestrial and aquatic invertebrate fauna including 19 notable species. Habitats of highest interest for invertebrates include an area of woodland in the north of the Development Site, mature trees within hedgerows across the Development Site and riparian bankside habitat along the River Ouzel.	UKBAP; RDB	NPPF; NE2; NE3	NERC 2006

KEY:

Conservation Status
MKWC - Milton Keynes Wildlife Corridor
LWS - Local Wildlife Site
BNS - Biological Notification Site
UKBAP - Contains Priority Habitats or is a Priority Species listed in the UK Biodiversity Action Plan
LBAP - Contains Priority Habitats or is a Priority Species listed in the Buckinghamshire and Milton Keynes Biodiversity Action Plan
AW - Woodland listed on Natural England's Inventory of Ancient Woodland
BOCC - Red- or amber-listed within 'Birds of Conservation Concern' Ref 24
RDB - Listed in the British 'Red Data Book' for insects.

Policy
Policies referred to in the table are listed below.
NPPF - 2019 National Planning Policy Framework
AW & VT - Standing Advice for Ancient Woodland and Veteran Trees Ref 18

Plan:MK 2016-2031 Ref 15
NE1 - Protection of Sites
NE2 - Protected Species and Priority Species and Habitats
NE3 - Biodiversity and Geological Enhancement
NE4 - Green Infrastructure

Legislation
EPS - European Protected Species under the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019
WCA - 1981 Wildlife and Countryside Act (as amended) (figures in superscript denote Schedules under which protection is delivered)
WCA1 - Some bird species receive additional protection under Schedule 1 of the 1981 Wildlife and Countryside Act (as amended)
WCA6 - Prohibits certain methods of killing and capture.
PBA - 1992 Protection of Badgers Act
Hedge Regs - Wildlife and Landscape Criteria of the 1997 Hedgerows Regulations
NERC 2006 - 2006 Natural Environment and Rural Communities Act

Table F5.2 Identification of the potential effects of the development for consideration on identified ecological receptors, in the absence of mitigation measures

Ecological receptor	Associated habitats / species	Value	Potential effects (in the absence of mitigation measures)
River Ouzel and Broughton Brook MKWCs (including Pineham Nature Reserve)	Watercourses and associated semi-natural habitats including aquatic and marginal vegetation, trees, scrub, rough grassland and tall ruderal vegetation, forming part of a wider network. Provides habitat for range of species including Otter, bats, birds, Great Crested Newts, invertebrates and notable plant species. Includes Pineham Nature Reserve.	District	**DURING CONSTRUCTION** - Waterborne pollution entering watercourses and other wetland habitats through site run-off or accidental spillage. - Adverse effects on the quantity/ continuity of flow of the watercourses. - Increased noise and lighting disturbance to wildlife currently using the river corridors. - Loss of connectivity where the River Ouzel is crossed by new road and foot/ cycle bridges. - Direct or indirect physical damage to retained trees and vegetation along the river corridors. - Establishment of substantial corridor of complementary semi-natural habitats within the linear park (beneficial). **DURING OPERATION** - Waterborne pollution entering watercourses through site run-off or accidental spillage. - Adverse effects on the quantity/ continuity of flow of the watercourses. - Increased noise and lighting disturbance to wildlife currently using the river corridors. - Increased recreational pressure on river corridors.
M1 MKWC	Road margins of woodland, scrub and trees and adjacent farmland forming part of a wider movement corridor through the Development Site and surrounding area for a range of species.	District	**DURING CONSTRUCTION** - Loss of scrub and trees of limited ecological importance in their own right and severance of existing wildlife corridor where crossed by new road. - Direct physical damage to retained trees, scrub, hedgerows and other retained vegetation and indirect damage through ground compaction, pollution, root severance, ground-level changes and loss of supportive habitat. - Increased light levels affecting value of retained and newly created habitat for wildlife. - Opportunity for establishment of new adjacent complementary scrub, woodland and scattered tree habitats as part of the Development Site's green infrastructure (beneficial). **DURING OPERATION** - Operational-phase direct and indirect physical damage to new and retained scrub and trees. - Increased light levels affecting value of retained and new habitats for wildlife.

Ecological receptor	Associated habitats / species	Value	Potential effects (in the absence of mitigation measures)
Other non-statutory designated sites and ancient woodlands within the ZoI	Sites of nature conservation importance at a County to District level. Includes a variety of predominantly wetland, woodland and grassland LWSs/ BNSs and areas of ancient woodland within the vicinity of the Development Site.	County-District	**DURING CONSTRUCTION** - Nitrogen deposition arising from an increase in traffic on local roads affecting habitats within the designated sites. **DURING OPERATION** - Nitrogen deposition arising from an increase in traffic on local roads affecting habitats within the designated sites. - Effects of an increase in recreational pressure on habitats and species for which the Development Sites are designated.
Network of hedgerows, ditches, scrub, treelines and scattered trees in combination	Habitat network for a range of wildlife including nesting birds, foraging/commuting bats, reptiles etc. Includes 'important' [Ref 8] hedgerows (potential veteran trees considered separately below).	District	**DURING CONSTRUCTION** - Loss of hedgerows and trees of limited ecological importance in their own right. - Severance of existing hedgerow corridors where crossed by roads/ cycleways/ footpath routes. - Direct physical damage to retained hedgerows, trees and scrub and indirect damage through ground compaction, pollution, root severance, ground-level changes and loss of supportive habitat for associated wildlife. - Increased light and noise levels affecting the value of retained hedgerows, ditches, scrub and trees for wildlife. - Establishment of new structural landscape planting and opportunity for other new hedgerow, scattered trees and ditch habitats as part of the Development Site's green infrastructure and SuDS network (beneficial). **DURING OPERATION** - Direct and indirect physical damage to hedgerows, scrub and trees. - Increased light and noise levels affecting the value of retained hedgerows, ditches, scrub and trees for wildlife.
Potential veteran trees (in combination)	Trees supporting veteran features generally associated with hedgerows and woodland areas. Of value to a range of species	District (low)	**DURING CONSTRUCTION** - Direct loss of potential veteran trees and deterioration of retained trees through loss of associated habitat. - Direct or indirect physical damage to retained potential veteran trees through ground compaction, pollution, root severance and ground-level changes. - Increased light and noise levels affecting value of retained potential veteran trees for wildlife.

Ecological receptor	Associated habitats / species	Value	Potential effects (in the absence of mitigation measures)
	including bats, birds and specialist invertebrates.		**DURING OPERATION** - Deterioration of retained trees through loss and damage to associated habitat. - Increased light and noise levels affecting value of retained potential veteran trees for wildlife.
Woodland parcels (in combination)	Habitat for wildlife including bats, Badgers, birds and invertebrates in addition to forming part of a habitat network across the wider Site.	Local (high)	**DURING CONSTRUCTION** - Loss of small areas of woodland. - Direct or indirect physical damage to retained woodland trees. - Increased light and noise levels affecting value of retained woodland for wildlife. - New woodland and orchard planting secured by parameters and opportunity for further establishment of new woodland planting and complementary habitats within open spaces (beneficial). **DURING OPERATION** - Increased light and noise levels affecting value of retained and new woodland areas for wildlife. - Damage to habitats resulting from an increase in recreational activity and tipping of garden waste.
Stream in east of site and network of ponds (outside of Pineham Nature Reserve)	Habitat for a range of species including Grass Snake, Great Crested Newt and invertebrates, provision of stepping stones for the movement of species through the Development Site, and habitat connectivity with the River Ouzel.	District	**DURING CONSTRUCTION** - Direct loss of pond habitats and loss of connectivity where the stream is crossed by roads. - Adverse effects on the quality and quantity of water entering the waterbodies and continuity of the flow of the eastern stream - Increased noise and light disturbance to wildlife currently using the waterbodies. - Creation of new complementary wetland habitats as part of the SuDS proposals and as stand-alone features (beneficial). **DURING OPERATION** - Adverse effects on the quality and quantity of water entering the waterbodies and continuity of the flow of the eastern stream. - Increased noise and light disturbance to wildlife currently using the waterbodies.
Species-poor semi-natural grassland and species-poor semi-improved	Provision of supportive habitat for a range of species including Badgers, reptiles, birds and invertebrates.	Local (moderate-high)	**DURING CONSTRUCTION** - Loss of areas of grassland habitat. - Opportunity to enhance existing grassland and establish new areas of species-rich meadow grassland habitats within the new linear park corridor and as part of the Development Site's wider green infrastructure (beneficial).

Ecological receptor	Associated habitats / species	Value	Potential effects (in the absence of mitigation measures)
grassland fields (in combination)			**DURING OPERATION** - None identified.
Arable fields, arable margins and improved grassland fields (in combination)	Although of negligible interest individually, these areas are of local interest due to their extent within the Development Site and provision of habitat for farmland bird species.	Local (moderate)	**DURING CONSTRUCTION** - Loss of arable habitat. **DURING OPERATION** - None identified.
Bats: roosting	Roosting in buildings, bridges and mature trees across the Development Site	Local (high)	**DURING CONSTRUCTION** - Injury/ mortality of roosting bats, destruction or abandonment of roosts and loss of bat roosting opportunities. **DURING OPERATION** - Injury/ mortality of roosting bats, destruction or abandonment of roosts and loss of bat roosting opportunities. - As the buildings/ trees of the Proposed Development age/ mature it is likely that these will provide new opportunities for roosting bats (beneficial).
Bats: foraging and commuting	At least ten species foraging and commuting within the Development Site, primarily in association with the River Ouzel, Pineham Nature Reserve and hedgerow network.	District (low)	**DURING CONSTRUCTION** - Mortality of foraging/ commuting bats and effects on foraging and commuting habitat through habitat loss and fragmentation and increased light levels. - Opportunities for enhanced foraging habitat within site's green infrastructure through establishment of new wetlands and meadow grassland, trees and scrub (beneficial). **DURING OPERATION** - Mortality of foraging/ commuting bats and effects on foraging and commuting habitat through habitat loss and fragmentation and increased light levels.
Otter	Present on the River Ouzel within the Development	District	**DURING CONSTRUCTION** - Risk of injury to/mortality of individual Otters during construction of new road and foot/cycleway crossings. - Fragmentation of River Ouzel corridor and increase in road traffic accidents through new road crossings.

Ecological receptor	Associated habitats / species	Value	Potential effects (in the absence of mitigation measures)
	Site as part of a wider territory.		- Degradation of habitat through waterborne pollution entering the River Ouzel/ Broughton Brook watercourses or alterations to the quantity/ continuity of flow. - Disturbance to habitat along river corridor due to noise, lighting and human activity. - Opportunity to enhance foraging habitat through enhancement of riparian habitats within the linear park (beneficial). - Opportunity to enhance the extent of potential holt sites through new scrub and tree planting within the linear park and provision of artificial holt (beneficial). **DURING OPERATION** - Increase in road traffic accidents through new road crossings. - Degradation of habitat through waterborne pollution entering the River Ouzel/ Broughton Brook watercourses or alterations to the quantity/ continuity of flow. - Disturbance to habitat along river corridor due to noise, lighting and human activity.
Badger	Three active outlying setts and 14 disused outlying setts present within the Development Site and. Grassland, field margins, hedgerow, scrub and woodland of potential value to foraging Badgers.	Local (low)	**DURING CONSTRUCTION** - Loss of Badger setts and injury/ mortality of occupying Badgers. - Loss of foraging habitat, isolation of retained setts from foraging habitat and increased mortality of Badgers through road traffic accidents. - Disturbance from human activities, noise and lighting. **DURING OPERATION** - Increased mortality of Badgers through road traffic accidents - Disturbance from human activities, noise and lighting.
Birds	Habitats within the Development Site of value to birds include arable land, woodland, hedgerows mature trees, grassland, scrub and rivers.	District (low)	**DURING CONSTRUCTION** - Effects on nesting birds through direct physical damage and indirect effects of disturbance on new and retained habitats. - Loss and fragmentation of habitats including trees, hedgerows, scrub and open farmland. - Opportunities for establishment of new breeding and foraging habitat and ecological corridors as part of site's green infrastructure (positive).

Ecological receptor	Associated habitats / species	Value	Potential effects (in the absence of mitigation measures)
			DURING OPERATION - Effects on nesting birds through direct physical damage and indirect effects of disturbance on new and retained habitats.
Reptiles	Low populations of Grass Snake and Slow-worm present across the Development Site in association with rough grassland, scrub, woodland edges, wetlands and hedgerow bases.	Local (low)	**DURING CONSTRUCTION** - Direct injury/ mortality of reptiles. - Reduction in the availability of suitable habitat from the Development Site. - Opportunity for creation and maintenance of areas of new habitat within the linear park and as part of the Development Site's wider green infrastructure (beneficial). **DURING OPERATION** - Disturbance and mortality of reptiles through increased predation and human activity.
Great Crested Newts	Breeding ponds present within and adjacent to the Development Site. Terrestrial habitat present within the Development Site including rough grassland, scrub, woodland and hedgerow bases.	District (low)	**DURING CONSTRUCTION** - Direct injury and mortality of individual GCN and reduction in available habitat. - Establishment of new potential breeding habitat and new terrestrial habitat (beneficial). **DURING OPERATION** - Increased likelihood of disturbance and accidental mortality through increased human activity.
Invertebrates	Habitats of highest invertebrate interest within the Development Site include the river corridor, woodland, hedgerows and mature trees.	District-County	**DURING CONSTRUCTION** - Direct loss of some areas of habitat supporting invertebrates. - Opportunities for creation of new areas of high-quality habitat in the linear park and other open spaces as part of site's green infrastructure (beneficial). **DURING OPERATION** - Establishment of new habitat in gardens and formal open spaces in areas formerly of low invertebrate interest such as arable land (beneficial).

F5.6 The following ecological receptors within the Development Site and in the ZoI of the Proposed Development have been identified as key ecological receptors in accordance with the methodology outlined in Section F5.2, which considers both the value of the receptor and the potential effects upon it. Further details for each are provided in Section F7.

1 River Ouzel and Broughton Brook MKWCs (including Pineham Nature Reserve);

2 M1 MKWC;

3 Other designated sites;

4 Network of hedgerows, ditches, scrub, treelines and scattered trees;

5 Potential veteran trees;

6 Stream in east of the Development Site and network of ponds (outside of Pineham Nature Reserve);

7 Bats;

8 Otters;

9 Birds;

10 Great Crested Newts; and

11 Invertebrates.

F5.7 All remaining ecological receptors identified within the Development Site are of no more than local interest and are not significant in an EIA context. Whilst these do not qualify for consideration as key ecological receptors, where appropriate these receptors are considered further in Section F8 in view of their inherent ecological interest and/ or nature conservation legislation and planning policy and guidance. These receptors include:

1 Woodland;

2 Badgers; and

3 Reptiles.

F5.8 In addition to the above, consideration is given to the habitat creation and enhancement opportunities generated through the Proposed Development of the Development Site.

F6.0 Inbuilt Mitigation Measures

Activities of the Proposed Scheme

F6.1 The Proposed Development and its construction is described in Chapter C. The Proposed Development drawings (Appendices C1 and C2 at Volume 2 to this ES) together with the maximum parameters described within Chapter C of this ES define the Proposed Development within the Development Site boundary.

F6.2 The construction phase of the Proposed Development will involve:

1 Tree and vegetation removal and tree protection works;

2 Building demolition and breaking out of hardstanding where required;

3 Excavation of SuDS attenuation features;

4 Installation and re-routing of services;

5 Construction of buildings and infrastructure; and

6 Landscape planting, further habitat creation and initial management works.

F6.3 Further details of the construction phase and programme are set out in Chapter C and these works are discussed in further detail below where relevant to the ecological assessment.

F6.4 In conducting the assessment of effects, mitigation measures and residual effects in Section F7 below, predicted effects have been separated into those occurring 'during construction' and those occurring 'during operation' for each receptor. It is acknowledged however that in view of the projected timeframe for delivery of the Proposed Development, the construction of later development phases would be expected to run concurrently with operation of earlier completed phases in some instances.

Ecological Design

F6.5 The EcIA process has been carried out simultaneously with the design of the Proposed Development, with the findings of ecological surveys providing informed advice on avoidance and reduction of ecological effects and opportunities for ecological enhancement. As a result of this iterative process, measures to address potentially significant effects have been incorporated into the scheme design, and both avoidance and mitigation are inherent within the Proposed Development.

F6.6 Table F6.1 provides a summary of the inherent avoidance and mitigation measures which have been incorporated during successive design iterations of the masterplan and can be secured in accordance with the Green Infrastructure Parameter Plan and detailed highways plans (Appendices C1 and C2, Volume 2 to this ES). Reference and consideration has also been given to the illustrative masterplan on a contextual level only (see Chapter C of this ES for further details).

Table F6.6.1 Inherent ecological avoidance and mitigation incorporated into the iterative design process

Habitat/Feature/Species	Description
River Ouzel and Broughton Brook MKWCs	Retention of corridor of existing semi-natural habitat along River Ouzel and Broughton Brook within a substantial corridor of informal open green space, including the River Ouzel Linear Park. This provides opportunities for strengthening of existing habitats through establishment of new complementary habitats such as wetlands, meadow grassland, woodlands and scrub. The river corridor and linear park will be free from

Habitat/Feature/Species	Description
	development with the exception of a single new road crossing, new foot and cycle bridges, expansion of an existing road crossing, and limited works including provision of SuDS, play areas and footpaths/ cycleways.
M1 MKWC	Retention of corridor of greenspace on both sides of the M1 corridor and provision of new landscape planting and other habitat creation works within the M1 corridor. The M1 corridor will be free from development with the exception of a single new road crossing and limited works including provision of services, SuDS and footpaths/ cycleways.
Network of hedgerows, ditches, scrub, treelines and scattered trees	Retention of the majority of on-site hedgerows/ treelines and ditches within linked corridors of informal greenspace and minimisation of gap creation within retained hedgerows. Establishment of new hedgerows and other linear and structural planting around the Development Site. Opportunities for substantial new scrub and tree planting within linear park and other areas of open space.
Potential veteran trees	Retention of the majority of potential veteran trees within the Development Site. Opportunities for creation of future veteran trees through retention of majority of mature trees together with new tree planting across the Development Site.
Grassland	Retention of the majority of species-rich semi-improved neutral grassland habitats within the linear park except where crossed by the new road. Opportunities for enhancement of retained species-rich and species-poor grassland and creation of substantial new complementary habitats within the linear park and other areas of informal open space.
Woodland	Retention of the majority of woodland parcels within linked corridors of informal greenspace. Provision of substantial new woodland, orchard and structural landscape planting around the Development Site, including a new woodland on the eastern site boundary.
Ponds and eastern stream	Retention of all ponds within the Pineham Nature Reserve and the majority of existing ponds within the wider site. Retention of the eastern stream within corridor of informal open space. The stream corridor will be free from development with the exception of two new road crossings and limited works including provision of SuDS, play areas and footpaths/ cycleways. Opportunities for creation of substantial new valuable wetland habitats as part of the SuDS proposals and as standalone features.
Bats: roosting, foraging/ commuting	Retention of the Daubenton's bat maternity roosts within the M1 bridges and retention of the majority of trees with potential to support roosting bats. Maintenance and enhancement of key areas for foraging and commuting bats including the river and stream corridors. Opportunities for maintenance of a network of habitat across the wider site including retention, creation and enhancement of grassland, wetland, scrub and woodland habitats.
Otter and Water Vole	Retention of River Ouzel and Broughton Brook watercourses and associated semi-natural habitats, and maintenance of habitat connectivity through design of road bridges to allow passage of mammals beneath. Opportunities for creation of new provision for Otter and Water Vole through creation of substantial new riparian habitat within the linear park and in association with new SuDS features across the Development Site.
Badgers	Retention of six of the identified outlying setts within undisturbed areas of informal greenspace. Maintenance of opportunities for new sett-building and foraging habitat in areas of open space across the

Habitat/Feature/Species	Description
	Development Site, including new orchard, woodland and structural landscape planting. Maintenance of movement corridors around the Development Site within network of linked green corridors associated with retained hedgerows.
Birds	Retention of watercourses and selected tree, scrub and hedgerow habitats. Creation of new woodland and orchard areas, new wetland habitat as part of SuDS and opportunities for enhancement of riparian and other wetland habitats, scrub, trees and grassland within the linear park and elsewhere in areas of open space throughout the Development Site. Opportunities for creation of new habitat for urban/garden birds within the development areas.
Reptiles	Retention of existing hedgerow bases and rough grassland habitats wherever possible. Opportunities for provision of new habitat in areas of open space across the Development Site, including riparian habitat, scrub, rough grassland and hedgerow bases. Maintenance of movement corridors around the Development Site within network of linked green corridors associated with retained hedgerows and other retained and new planting. Creation of new wetland habitats in association with the SuDS will provide improved marginal habitat and increase amphibian prey for Grass Snake.
Great Crested Newts	Retention of the majority of ponds supporting existing populations of Great Crested Newt. Creation and establishment of new ponds across the Development Site in association with the SuDS or as stand-alone features within a network of linked green corridors to provide opportunities for the existing population to expand within the Development Site.
Invertebrates	Retention and creation of key invertebrate habitats including rivers and stream, hedgerows, potential veteran trees, grassland and new waterbodies associated with the SuDS.

F7.0 Assessment of Effects, Mitigation Measures and Residual Effects: Key Ecological Receptors

F7.1 This section provides detailed information on the nature of potential effects on the key ecological receptors listed in Section F5.4, and describes the avoidance, reduction, mitigation and compensation measures to be employed in each case in line with CIEEM guidelines. Ecological enhancements relevant to the expected long-term status of the ecological receptors are also discussed, along with an assessment of any residual effects following implementation of the specified mitigation. As mentioned above, each ecological receptor is addressed in turn. Given the range of ecological receptors and effects for consideration, this deviation from the approach taken in other chapters provides a more coherent approach.

F7.2 Consistent with CIEEM guidance the structure of the chapter considers the likely significant effects, mitigation measures and residual effects for each receptor in turn. The use of headings allows signposting of each matter consistent with other chapters of the ES.

Key Ecological Receptor: River Ouzel and Broughton Brook MKWCs (including Pineham Nature Reserve)

F7.3 The River Ouzel and Broughton Brook MKWCs and their associated corridors, including the Pineham Nature Reserve located at the confluence of the two rivers, are considered to be of district value. These watercourses and the corridors of habitat through which they flow provide a connective corridor and habitat for a range of wildlife through an otherwise largely developed and farmed landscape.

Likely Significant Effects

F7.4 The Proposed Development will retain bankside habitats along the River Ouzel and Broughton Brook where they flow through the Development Site. With the exception of two new road crossings and six pedestrian/ cycle crossings over the River Ouzel, no development is shown on the parameters within 30m of either of the rivers that might otherwise affect their current value for the movement of wildlife. A new linear park is proposed that will effectively create a corridor with a minimum width of 49m (and maximum width of 605m) along the rivers, which will largely comprise semi-natural habitats in accordance with the Green Infrastructure Parameters Plan (Appendix C2, Volume 2 of this ES).

F7.5 Notwithstanding proposals for the retention and enhancement of bankside habitats, the Proposed Development has potential to affect the integrity of the River Ouzel and Broughton Brook corridors through:

1 Construction and operational phase waterborne pollution entering the watercourses and other wetland habitats through site run-off or accidental spillage;

2 Construction and operational phase adverse effects on the quantity/ continuity of flow of the watercourses;

3 Increased noise and lighting disturbance to wildlife currently using the river corridors during the construction and operational phases;

4 Loss of connectivity where the River Ouzel is crossed by new road and foot/ cycle bridges;

5 Construction phase direct or indirect physical damage to retained trees and vegetation along the river corridors; and

6 Increased recreational pressure on the river corridors during the operational phase;

F7.6 Each of these potential effects is considered in turn below.

Effect 1: Waterborne pollution entering the watercourses and other wetland habitats through site run-off or environmental accidents

During Construction

Effects

F7.7 Construction phase activities have the potential to cause pollution of the watercourses and associated wetland habitats through fuel and oil spillages, leakage from storage containers, construction worker facilities and increases in sediment run-off during soil stripping and construction works.

F7.8 Spillage of contaminants and silt flotation during construction represents a potentially negative effect, causing damage to hydrological processes and associated flora and fauna. A major spillage of contaminants could potentially affect significant parts of the rivers and other associated wetland habitats, both within the Development Site and downstream. This could result in short to long-term effects on the integrity of the ecosystem and associated aquatic species such as mammals, invertebrates, amphibians and fish.

F7.9 In the absence of mitigation, it is considered probable that such a spillage would directly result in a significant negative effect on a receptor of district importance. Effects could potentially be intermittent or cumulative. Depending on the nature and extent of the pollution incident, any such incidents have the potential to be permanent and irreversible although lesser effects are much more likely.

Avoidance and Mitigation

F7.10 Pollution avoidance measures to be implemented to prevent physical and chemical pollutants entering the drainage system during the construction phase should be included within the Construction Environmental Management Plan [CEMP] for the proposed development which should include the following:

1 During the construction phase, workers should be fully briefed on ecologically sensitive habitats and all construction activities should be conducted in accordance with the Environment Agency's Pollution Prevention Guidance [Ref 10];

2 Design and implementation of a temporary drainage strategy that captures waterborne pollution prior to entering the watercourses and other associated wetland habitats, incorporating settlement tanks and/or interceptors where necessary; and

3 All hazardous liquids and chemicals should be stored and utilised in accordance with the Control of Substances Hazardous to Health (COSHH) Regulations 2002.

Residual Effects

F7.11 With the above measures in place across the Development Site, it is considered that a significant negative effect on the River Ouzel, Broughton Brook and any associated wetland habitats or off-site downstream waterbodies arising from pollution during the Development Site construction phase would be extremely unlikely either on a district or local level. The overall residual effect is therefore expected to be negligible at a local level.

During Operation

Effects

F7.12 During the operational phase, in the absence of mitigation the watercourses and associated retained and newly created wetland habitats may be directly affected by inadequately contained pollution incidents which enter the SuDS outfall systems. In extreme cases, this has potential to cause permanent large adverse effects on a receptor of up to district value resulting in a major effect. Effects could potentially be regular, intermittent or cumulative. It is more likely however that the effect of such pollution incidents would be temporary, largely contained and diluted by the SuDS attenuation basins, and would be reversible in the short-term. As such, a significant pollution incident is considered unlikely.

Avoidance and Mitigation

F7.13 Chapter L (Water Environment and Drainage) describes an outline surface water drainage strategy to ensure that the Proposed Development achieves at least greenfield surface water run-off rates through the use of surface water attenuation measures and SuDS, in accordance with national policy and guidance. Further details are set out in Chapter L.

F7.14 This includes the interception of water leaving the Development Site in attenuation features from which water entering the rivers will be controlled. Although significant pollution incidents are unlikely to occur during the operational phase, it is recommended that pollution control measures such as interceptor tanks and sediment traps are provided at critical points along the drainage infrastructure (e.g. as part of the road infrastructure, and in association with car parks) to further avoid risk of pollution entering the rivers.

F7.15 The Proposed Development provides opportunities to reduce current levels of pollution likely to be affecting the quality of aquatic habitat provided by the River Ouzel and Broughton Brook by replacing riverside habitats currently dominated by intensively farmed agricultural land within the Development Site with new species-rich grassland, scrub, woodland and wetland habitats in accordance with those detailed in the Illustrative Masterplan (Appendix C3, Volume 2 to this ES). These measures have potential to reduce the existing level of nutrients and sediment that are currently entering the watercourses through existing agricultural run-off, in keeping with the objectives of the Anglian River Basin Management Plan [Ref 9].

Residual Effects

F7.16 With the above measures in place across the Development Site, it is considered that a significant negative effect on the River Ouzel and Broughton Brook and associated waterbodies arising from pollution during the operational phase would be avoided. Subject to appropriate design of SuDS features and habitat enhancements along the river corridor, the development would be expected to improve the quality of the water entering the rivers from the Development Site and therefore the overall residual effect is near certain to be beneficial at a local level.

Effect 2: Adverse effects on the quantity and continuity of flow of the watercourses

During Construction

Effects

F7.17 In the absence of mitigation, construction of the Proposed Development may lead to a negative effect on the supply of water entering the rivers during the construction phase. This may arise from either: (i) additional drying due to diversion of surface or groundwater feeding into the watercourses; or (ii) greater variability in the rate of supply to the watercourses as a result of

more rapid delivery following rainfall from compaction of soil, laying of impermeable surfaces etc.

F7.18 In extreme circumstances (e.g. substantial downstream flooding of the River Ouzel) this could result in a significant negative effect at a district level depending on the severity of the effect and the aquatic species affected. Effects are likely however to be reversible and temporary.

Avoidance and Mitigation

F7.19 In order to avoid these effects, both in terms of the quantity of water entering the watercourses and the steadiness of supply, measures to be implemented during the construction phase are described within Chapter L (Water Environment and Drainage). These include installation of permanent drainage works in advance of introduction of impermeable surfaces where possible, and installation of temporary drainage measures where this is not possible. These would mimic the current site drainage as far as possible.

Residual Effects

F7.20 With the above measures in place, it is considered extremely unlikely that a significant negative effect on the supply of water entering the River Ouzel or Broughton Brook would arise during the construction phase and the overall residual effect is expected to be negligible at a local level.

<u>During Operation</u>

Effects

F7.21 During the operational phase, adverse effects on the rivers may arise from greater variability in the rate of supply to the watercourses as a result of a higher proportion of impermeable surfaces at the Development Site resulting in more rapid delivery following rain events.

F7.22 In extreme circumstances (e.g. substantial downstream flooding of the River Ouzel) it is probable that this could result in a significant negative effect at a district level depending on the severity of the effect and the aquatic species affected. Effects are likely however to be reversible and temporary.

Avoidance and Mitigation

F7.23 Recommended measures to avoid and/ or mitigate this effect and deliver overall enhancements to the rivers, both in terms of the quantity of water entering the watercourses and the steadiness of supply, should include:

1 Avoidance of reduction in ground levels where this may adversely affect the contribution of groundwater into the watercourses;

2 Appropriate design and use of any land drains, filter drains and groundwater pumping required, to maintain current water levels entering the watercourses;

3 Use of surface water drainage and SuDS features to maintain the quantity and continuity of water entering the watercourses; and

4 Controlled release of water from the surface water drainage infrastructure to reflect greenfield run-off rates (and allowance for climate change) to protect against spatiness caused by climate change and to mitigate existing development upstream of the Development Site.

F7.24 These measures are reflected in the surface water drainage strategy described within Chapter L (Water Environment and Drainage).

Residual Effects

F7.25 With the above measures in place, it is considered extremely unlikely that a significant negative effect on the supply of water entering the River Ouzel or Broughton Brook would arise during the operational phase and the overall effect is expected to be negligible at a district or local level.

Effect 3: Increased noise and lighting disturbance to wildlife currently using the river corridors.

F7.26 In the absence of avoidance and mitigation measures, unsympathetic noise and lighting levels within or adjacent to the river corridor have the potential to adversely affect wildlife such as Otters, bats and birds using this key receptor within the Development Site.

During Construction

Effects

F7.27 Negative effects of noise and lighting during the construction phase could potentially arise from a number of sources. These include:

1 Use of loud machinery in, or in proximity, to the river corridors;

2 Loud activities such as pile driving in, or in proximity to the river corridors; and

3 Light spill on the river corridors from workers compounds, security lighting or floodlights used for night-time working.

F7.28 Assuming a worst-case scenario in that the integrity of all parts of the river corridors within the Development Site were affected simultaneously, this could result in a significant effect at a district level, albeit extremely unlikely, reversible and temporary during the construction phase.

Avoidance and Mitigation

F7.29 In order to avoid these effects during the construction phase, either wholly or in part, the following measures should be implemented throughout the construction phase:

F7.30 Noise: Measures to avoid adverse effects of noise during the construction phase should be implemented in line with the adoption of 'Best Practicable Means' (Control of Pollution Act, 1974). Recommended measures are described in Section H5.0 of Chapter H (Noise and Vibration) of this ES. and these should be applied to sensitive ecological receptors. These include:

1 Mobile and static plant will be located as far as possible away from noise sensitive receptors, this should include the river corridors.

2 If the noise is directional the source should be pointed away from noise sensitive receptors whenever practical, this should include the river corridors.

3 The location and orientation of site offices and buildings will be considered in order to maximise the separation distance and screening provided from site operations to noise sensitive receptors such as the river corridors.

4 A policy will be adopted where plant on site is reviewed to ensure it is the quietest available for the required task.

5 Engines will be switched off when vehicles are stationary – there should be no idling vehicles.

6 When reversing, mobile plant and vehicles will travel in a direction away from noise sensitive receptors such as the river corridors whenever possible.

7 The use of white noise and directional reversing warning alarms will be employed on all mobile plant in order to reduce impacts, whenever possible.

8 In-cab communication systems will be employed removing the impact of short duration horn use, whenever possible.

9 All plant, equipment and vehicles will be fitted with appropriate noise suppression equipment to reduce noise levels as far as is practicable.

10 Generators and compressors will be located within suitable acoustic enclosures that do not affect the ventilation requirements or restrict access for maintenance.

11 Restrictions on the hours of construction to 08:00 – 18:00 hours on weekdays, and 08:00 – 13:00 hours on Saturdays, with the exception of some night-time works for bridge construction over the M1.

F7.31 In addition to these, construction works within and immediately adjacent to the stream corridor should avoid the March to September (inclusive) bird breeding season as far as possible.

- Lighting: Night-time illumination of the river corridors should be avoided throughout the construction phase, with site compounds, floodlighting and security lighting established a minimum of 30m away from the river corridors, using directional and hooded lighting to avoid light spill into these areas, fitted with low spectrum (warm) bulbs. Dimmers, motion detectors and timers should also be employed where appropriate. Measures outlined in Section F7.184 below should also be implemented in relation to lighting in the vicinity of the river corridors and in addition, night-time working should be avoided within 10m of the banks of the watercourses. It is recommended that the detailed lighting scheme and compound areas for the construction phase are reviewed by a suitably qualified ecologist at an appropriate stage prior to works commencing to ensure effects of lighting on the integrity of this receptor are avoided.

Residual Effects

F7.32 Following implementation of the above measures as appropriate to avoid effects of lighting and noise on this receptor, it is near-certain that no significant residual effect would be expected to occur at either a district or local level during the construction phase and the overall residual effect is therefore expected to be negligible at a local level.

<u>During Operation</u>

Effects

F7.33 As discussed in Chapter H (Noise) significant negative effects of noise are not expected during the operational phase. Adverse effects of lighting may arise however from the following sources:

1 At the new road crossing point or where access infrastructure is located in close proximity to the river corridors; and

2 Light spill from the Proposed Development (e.g. from residential security lighting).

F7.34 Assuming a worst-case scenario in that the integrity of all parts of the river corridors within the Development Site are affected simultaneously, this would result in a permanent significant negative effect at a district level, albeit extremely unlikely and reversible.

Avoidance and Mitigation

F7.35 In order to avoid negative effects of lighting during the operational phase, in keeping with the Lighting Assessment Report (Appendix C5, Volume 2 of this ES), the following measures are recommended:

1 Any lighting proposals within or adjacent to the river corridor should be of the minimum level required for public safety using low-level, hooded and directional lighting as appropriate, fitted with low spectrum (warm) bulbs. Dimmers, motion detectors and timers should also be employed where appropriate; and

2 Lighting proposals for development in the vicinity of the rivers should be designed to avoid significant light spill into the river corridor.

F7.36 Lighting proposals for the Proposed Development should be reviewed at an appropriate stage by a suitably qualified ecologist.

Residual Effects

F7.37 Following implementation of the above measures to avoid effects of lighting and noise on the River Ouzel and Broughton Brook corridors, no significant residual effect would be expected to occur on these receptors during the operational phase at either a district or local level and the overall residual effect is therefore likely to be negligible at a local level.

Effect 4: Loss of connectivity where the River Ouzel is crossed by new road and foot/ cycle bridges

During Construction (continuing during Operation)

Effects

F7.38 Three road bridges currently cross the River Ouzel within the Development Site, including at the A422 crossing in the north of the Development Site and at the M1 and Tongwell Street crossings in the south of the Development Site. The M1 crossing also forms a bridge over the Broughton Brook at the southern end of the Development Site, albeit just outside the Development Site boundary. Although these bridges are all heavily engineered, with artificial reinforced riverbanks and margins below, and minimal bankside vegetation present, all the bridges allow some passage of wildlife beneath them. The rivers therefore currently provide continuous corridors for wildlife movement through the western part of the Development Site, extending into the wider area.

F7.39 Although no alterations are proposed to the existing M1 crossing over the Broughton Brook, the bridge works proposed over the River Ouzel, namely the two new road crossings and six new foot/ cycleway bridges, would not be expected to result in significant habitat loss, however inappropriate design of these new crossings has potential to impede the movement of terrestrial and aquatic wildlife along the existing habitat corridor provided by the river. This effect would arise during the construction phase and continue throughout the operation of the Proposed Development. In the absence of mitigation such impediments would be likely and permanent and, assuming no other suitable corridors exist, in extreme circumstances, significant at a district level.

Avoidance and Mitigation

F7.40 In order to avoid significant effects resulting from fragmentation of the River Ouzel corridor, the following measures are proposed:

1 No additional crossing points should be provided other than that required for the two new road bridges and six new foot/ cycleway bridges;

2 All new road bridges will be sensitively designed to allow passage of wildlife beneath and outside of the aquatic zone at times of flood, including incorporation of mammal ledges and continuation of marginal vegetation along the watercourse beneath the bridge where appropriate; and

3 The use of lighting at the river corridor crossing point should be restricted to the minimum level required during the construction and operational phases for public safety. Where lighting is required on bridges, this should employ low-level, hooded and directional lighting as appropriate, fitted with low spectrum (warm) bulbs. Dimmers, motion detectors and timers should also be employed where appropriate (see paragraph F7.184).

Residual Effects

F7.41 With the above measures in place, in combination with implementation of the substantial habitat creation, retention and enhancement opportunities within the linear park (see Section F7.49 below), it is considered extremely unlikely that the Proposed Development would result in a significant negative effect on the integrity of the habitat corridor provided by the River Ouzel at either a district or local level. The overall residual effect is therefore expected to be negligible at a local level.

Effect 5: Direct and indirect physical damage to retained trees and vegetation along the river corridor

During Construction Only

Effects

F7.42 Effects on retained trees, scrub and other riparian vegetation along the river corridor during the construction phase may include direct damage (e.g. by reversing vehicles), ground compaction, pollution, root severance and ground level changes. Damage to individual trees may adversely affect their longevity or their potential ability to support nesting birds and invertebrates. Although near-certain in the absence of avoidance and mitigation measures, such negative effects are likely to be localised and temporary, affecting only a small proportion of the existing vegetation, and are likely to be reversible in the medium to long-term.

F7.43 The effects of dust smothering on retained vegetation during the construction phase are also considered in this section, although again, significant negative effects are extremely unlikely in view that any effects are likely to be localised and temporary, affecting only a small proportion of the existing vegetation, and are likely to be reversible in the short to medium-term.

F7.44 The above works relate to the construction phase only. Significant direct and indirect physical damage to retained riparian vegetation along the stream corridor is highly unlikely to occur during the operational phase of the Proposed Development.

Avoidance and Mitigation

F7.45 Measures should be employed during the construction phase to avoid damage to retained vegetation along the river corridor, including:

1 Works in the vicinity of retained trees, hedgerows and scrub should be carried out in accordance with BS5837: Trees in Relation to Construction [Ref 3], unless otherwise carried out under an Arboricultural Method Statement approved by the Local Planning Authority; and

2 Installation of temporary fencing in the vicinity of other retained habitats such as marginal vegetation and existing floodplain grassland to prevent access by machinery, unauthorised site personnel, storage of materials etc. Where limited works are required within fenced-off areas (e.g. for construction of footpaths) then works may require supervision under an Ecological Watching Brief.

F7.46 As described in Chapter G (Air Quality) measures to avoid adverse effects of dust will also be effective in relation to the retained vegetation within the vicinity of the river corridor. These will

be provided in a best practice Dust Management Plan to be written and implemented for the Development Site.

F7.47 In addition to the measures listed in Chapter G, additional measures to reduce dust during the construction phase should include:

1 No bonfires or unauthorised burning of material anywhere on-site;

2 Minimisation of dust generating activities;

3 Location of dusty activities and stockpiles away from the river corridors and any other sensitive receptors;

4 Maintenance of construction traffic and plant in good working order and switched off when not in use;

5 Covering of all loads entering and leaving the Development Site;

6 Imposition of an appropriate site speed limit; and

7 Use of appropriately designed vehicles for materials handling.

F7.48 At present, semi-natural riparian habitats within the Development Site are limited and generally confined to narrow corridors along the riverbanks through an otherwise intensively farmed landscape. The development Parameters secure the provision of a linear park along the River Ouzel/ Broughton Brook corridor passing through the Development Site. This will have a minimum width of approximately 49m and extend up to approximately 605m in width, as shown on the Green Infrastructure Parameters. Except where the two new crossing points for access bridges occur, the corridor will be free from development with the exception of limited works such as provision of SuDS features, footpath/ cycleways and play areas.

F7.49 The linear park provides substantial opportunities for ecological enhancements within the River Ouzel and Broughton Brook corridors. In line with the measures proposed within the Illustrative Masterplan (Appendix C3, Volume 2 to this ES), the ecological function of the linear park should be maximised through provision of a range of semi-natural habitats such species-rich rough and meadow grassland, native species-rich scrub and hedgerows, woodland and tree planting, enhancements to the existing river channels including reprofiling of the riverbanks to create more naturalised margins supporting a mix of marginal and aquatic plant species, creation of new floodplain pools/ backwaters, and provision of a variety of other new wetlands including permanent and ephemeral waterbodies, reedbeds, swales and wet grasslands.

F7.50 The linear park should be subject of a Landscape and Ecological Management Plan (LEMP) to ensure the successful establishment of a valuable range of habitats and to outline a programme of management to maintain the proposed newly created and enhanced habitats and maximise the biodiversity value of the area in the long-term.

Residual Effects

F7.51 Following implementation of the avoidance measures described above, significant direct and indirect negative effects arising from damage to retained vegetation along the river corridors during the construction phase are extremely unlikely at either a district or local level. The overall residual effect on the River Ouzel and Broughton Brook MKWCs is therefore expected to be negligible at a site level.

F7.52 Subject to appropriate design of new habitats within the linear park in line with the recommendations above, habitat creation and enhancements have potential for substantial enhancement of the habitat resource provided by the River Ouzel and Broughton Brook corridors in the long-term.

Effect 6: Increased recreational pressure along the river corridors

During Operation Only

Effects

F7.53 Subject to implementation of the measures described above to protect retained vegetation during the construction phase, adverse effects of recreational pressure are expected to arise during the operational phase of the Proposed Development only.

F7.54 There are currently no Public Rights of Way along either the River Ouzel or Broughton Brook within the Development Site and public access is restricted to a short sections of hard-surfaced formal pathway along the River Ouzel in the Parks Trust land in the south-west of the Development Site. Through the establishment of the river corridor as a linear park with provision of new footpaths and cycleways, the Proposed Development is expected to increase the existing recreational use of the river corridor by people and dogs through the remainder of the Development Site. In the absence of mitigation, this could contribute towards disturbance and deterioration of riparian habitats and a reduction in their ability to support wildlife associated with the rivers such as Otters, birds and invertebrates, and may also increase erosion of the riverbanks where accessed by people and dogs.

F7.55 In extreme circumstances (e.g. substantial degradation and erosion of all river banks within the Development Site) this could result in a significant negative effect at a district level. Effects are likely however to be localised and reversible.

Avoidance and Mitigation

F7.56 During the operational phase, negative effects on the integrity of the river corridor from increased recreational activity should be managed through:

1 To encourage users away from sensitive areas/ maintain undisturbed areas of habitat, footpaths within the linear park should include formalised and way-marked routes in the least sensitive areas. Additionally consideration could be given to provision of features such as dog dips and bird watching screens to focus activities within appropriate areas.

2 Scrub planting, hedgerow planting, provision of wetland habitats and / or permanent fencing should be employed to deter public access to sensitive areas.

3 Provision of information to users on the sensitive use of the linear park. This could be achieved through a selection of measures including wardening and provision of information through signage, leaflets, a website and/ or information in Home Information Packs.

4 Furthermore, the enhancement and creation of habitats of ecological value described above would be expected to increase the resilience of the river corridors for a range of species.

Residual Effects

F7.57 Following implementation of the avoidance and mitigation measures described above, and in consideration of the habitat enhancement measures described above, significant negative effects arising from increased recreational pressure along the River Ouzel and Broughton Brook river corridors are extremely unlikely at either a district or local level. The overall residual effect is therefore expected to be negligible at a local level.

Key Ecological Receptor: M1 MKWC

F7.58 The M1 MKWC located in the south of the Development Site is considered to be an integral part of a receptor of district value. The corridor comprises scrub, woodland, scattered tree and farmland habitats which provide a connective corridor and habitat mosaic likely to be used by a

range of wildlife. The semi-natural habitats associated with the corridor also combine with woodland, hedgerows, scrub and tree lines within the Development Site, thereby contributing towards the network of habitats allowing the movement of wildlife around the Development Site and wider area.

Likely Significant Effects

F7.59 Development proposals within the M1 corridor are restricted to construction of a new road crossing connected to Tongwell Street and alterations to the A509 roundabout access off the M1. The development parameters identify that corridors of informal open space will be retained along both sides of the M1 within the Development Site in association with the informal open space and structural planting.

F7.60 The following potential effects of the Proposed Development have been identified which might, in the absence of mitigation measures, negatively affect the integrity of this receptor:

1 Loss of scrub and trees of limited ecological importance in their own right and severance of the existing wildlife corridor where crossed by the new road;

2 Construction phase direct physical damage to retained trees, scrub, hedgerows and other retained vegetation and indirect damage through ground compaction, pollution, root severance, ground-level changes and loss of supportive habitat; and

3 Increased light levels affecting value of retained and newly created habitat for wildlife during the construction and operational phases.

Effect 1: Loss of scrub and trees of limited ecological importance in their own right and severance of the existing wildlife corridor where crossed by the new road

During Construction (continuing during Operation)

Effects

F7.61 Proposals for the new road crossing indicate that a maximum length of 273m of the M1 corridor will be affected by the proposed construction works, within which it is expected that the majority of existing vegetation will be lost while the works take place. The remainder of the M1 corridor will nevertheless be retained and not directly affected by the proposed works, and in addition the development Parameters secure buffers of open space along both sides of the M1 corridor within the Development Site, outside the footprint of the new road, including the substantial linear park to the north which provides opportunities for establishment of complementary habitats as discussed in Section F9.3 and indicated on the Illustrative Masterplan (Appendix C2, Volume 2 of this ES).

F7.62 Notwithstanding the new habitat creation opportunities described above, in extreme circumstances (e.g. all the vegetation and connectivity within the area affected by highways works is permanently lost) the Proposed Development could potentially result in a permanent significant negative effect at up to a district level in the corridors role in providing ecological connectivity across the Development Site and the wider area.

Avoidance and Mitigation

F7.63 In order to avoid significant effects resulting from habitat loss and fragmentation of the M1 corridor, the following measures are proposed:

1 No additional crossing points should be provided other than that required for the new road crossing. Construction works within the M1MKWC should be restricted to the minimum area necessary;

2 The new road bridge should be sensitively designed to allow passage of wildlife beneath through use of underpasses or wildlife tunnels;

3 Replacement scrub and tree planting should be established on the affected M1 embankments outside of the road footprint using native species typical of the local area, sourced from stock of local provenance where available; and

4 The use of lighting at the new crossing point should be restricted to the minimum level required during the construction phase (see Section F7.184).

F7.64 The Proposed Development provides substantial opportunities for habitat creation and enhancement within the M1 corridor and connected linear park and wider road network. As indicated on the Illustrative Masterplan (Appendix C3, Volume 2 to this ES), the development parameters provide opportunity for a range of new habitats to be established within these areas including woodland, scrub, scattered trees and hedgerows, rough and meadow grassland, and new wetlands within areas currently comprising arable land and agriculturally improved grassland of limited ecological value.

Residual Effects

F7.65 With the above measures in place, it is considered extremely unlikely that there would be any significant loss of habitat resource or connectivity at a district or local level as a result of the proposed new road crossing. The overall residual effect on the M1 MKWC is therefore expected to be negligible at a local level.

F7.66 Subject to appropriate design, habitat creation and enhancement within areas of the Development Site within and adjacent to the M1 corridor could be expected to provide substantial complementary habitat to that currently present and may enhance the integrity of the corridor in the long-term.

Effect 2: Direct physical damage to retained trees, scrub, hedgerows and other retained vegetation and indirect damage through ground compaction, pollution, root severance, ground-level changes and loss of supportive habitat

During Construction Only

Effects

F7.67 Effects on retained trees, scrub and other vegetation along the M1 corridor during the construction phase may include direct damage, ground compaction, pollution, root severance and ground level changes, which may negatively affect the ability of the vegetation to support wildlife such as birds and invertebrates. Such effects are likely to be localised and temporary, affecting only a small proportion of the existing vegetation, but are likely to be reversible in the medium to long-term.

F7.68 The effects of dust smothering of retained trees, scrub and other vegetation during site preparation and construction are also considered in this section, although only small amounts of dust generation are likely to occur, and any effects are likely to be localised and temporary, affecting only a small proportion of the existing vegetation along the M1 MKWC, and are likely to be reversible in the short to medium-term.

Avoidance and Mitigation

F7.69 Measures should be employed during the construction phase to avoid damage to retained vegetation along the M1 MKWC, including:

1 Works in the vicinity of retained trees, hedgerows and scrub should be carried out in accordance with BS5837: Trees in Relation to Construction [Ref 3], unless otherwise carried

out under an Arboricultural Method Statement approved by the Local Planning Authority; and

2 Installation of temporary fencing in the vicinity of other retained habitats such as marginal vegetation and existing floodplain grassland to prevent access by machinery, unauthorised site personnel, storage of materials etc. Where limited works are required within fenced-off areas then works may require supervision under an Ecological Watching Brief.

F7.70 Measures to avoid negative effects of dust on retained vegetation both within and adjacent to the Development Site are described in Chapter G (Air Quality) of the ES and are summarised in Sections F7.46-7.47 above. It is considered that through implementation of these measures, adverse effects of dust smothering on retained vegetation during the construction phase can be avoided.

Residual Effects

F7.71 Following implementation of the avoidance measures described above, significant direct and indirect negative effects arising from damage to retained trees and other vegetation along the M1 corridor during the construction phase are extremely unlikely. As such, in combination with the habitat creation works and the measures to maintain connectivity described above, the effect on the integrity of the M1 MKWC habitats would be negligible at a local level.

Effect 3: Increased light levels affecting value of retained and newly created habitat for wildlife

F7.72 Although existing built development along the southern edge of the M1 corridor and the traffic already using the motorway result in some artificial lighting along the M1 MKWC, there are currently no lighting installations along the majority of the section of the M1 MKWC associated with the Development Site. In the absence of avoidance and mitigation measures, unsympathetic lighting installed as part of the development has the potential to negatively affect wildlife such as bats and birds using this section of the M1 MKWC.

<u>During Construction</u>

Effects

F7.73 Negative effects of lighting on the habitats along the M1 corridor during the construction phase could potentially arise from a number of sources including workers compounds, security lighting or floodlights used for night-time working.

F7.74 Assuming a worst-case scenario in that the integrity of all parts of the corridor within the Development Site were affected simultaneously, this could result in a localised and temporary effect, affecting only a small proportion of the total wildlife corridor, and is likely to be reversible in the short to medium-term.

Avoidance and Mitigation

F7.75 In order to avoid these effects, either wholly or in part, the following measures should be implemented throughout the construction phase of the development:

1 Night-time illumination of the M1 MKWC should be avoided throughout the construction phase, with site compounds, floodlighting and security lighting established a minimum of 20m away from any semi-natural habitats within the corridor. Lighting design should employ use of directional and hooded lighting to avoid light spill into the M1 MKWC, fitted with low spectrum (warm) bulbs. Dimmers, motion detectors and timers should also be employed where appropriate. Measures outlined in Section F7.184 below should also be

implemented in relation to lighting in the vicinity of the M1 MKWC and, where possible, night-time working should be avoided within 10m of the corridor; and

2 The lighting scheme and works areas for the construction phase should reviewed by a suitably qualified ecologist at an appropriate stage prior to works commencing to ensure effects of lighting on the integrity of this receptor are avoided.

Residual Effects

F7.76 Following implementation of the above measures as appropriate to avoid effects of lighting on the M1 habitat corridor, it is near-certain that no significant residual effects would be expected to occur at either a district or local level during the construction phase.

During Operation

Effects

F7.77 Other than the road bridge discussed in Section F7.61 above, no new built development is proposed within or immediately adjacent to the M1 corridor however footpaths would be created within areas of informal open space proposed adjacent to the M1 corridor. Adverse effects of lighting during the operational phase may therefore arise from the following sources:

1 Lighting at footpath and cycleways where these are located in close proximity to the M1 corridor; and

2 Light spill from the new road bridge and from nearby development such as security lighting.

F7.78 Assuming a worst-case scenario in that the integrity of all parts of the corridor are affected simultaneously, this would result in a permanent negative effect at a district level albeit extremely unlikely and reversible.

Avoidance and Mitigation

F7.79 In order to avoid the adverse effects of lighting during the operational phase, in keeping with the Lighting Assessment Report (Appendix C5, Volume 2 of this ES), the following measures should be implemented:

1 Lighting proposals within or adjacent to semi-natural habitats within the M1 corridor should be of the minimum level required for public safety using low-level, hooded and directional lighting as appropriate, fitted with low spectrum (warm) bulbs. Dimmers, motion detectors and timers should also be employed where appropriate;

2 Lighting proposals in the vicinity of the M1 MKWC should be designed to avoid significant light spill into semi-natural habitats associated with the M1 corridor and adjacent buffer zone; and

3 Lighting proposals for the development should be reviewed at an appropriate stage by a suitably qualified ecologist.

Residual Effects

F7.80 Following implementation of the above measures to avoid effects of lighting on the M1 MKWC, it is near-certain that no significant effect would be expected to occur during the operational phase and the residual effect will be negligible at a local level.

Key Ecological Receptor: Other designated sites

F7.81 A number of locally designated areas within the vicinity of the Development Site are considered in this assessment with regard to the potential effects of the Proposed Development on the

integrity of the habitats and species for which they are designated. These include three LWSs and 13 BNSs in the ZoI listed in Section F4.5 above, as well as areas of woodland included on Natural England's Inventory of Ancient Woodland occurring within the vicinity of the Development Site.

Likely Significant Effects

F7.82 The potential effects of the Proposed Development on these designated sites include:

1 Construction and operational phase Nitrogen deposition arising from an increase in traffic on local roads affecting habitats within the designated sites; and

2 Effects of an increase in recreational pressure on habitats and species for which the Development Sites are designated during the operational phase.

F7.83 These are considered below.

Effect 1: Nitrogen deposition arising from an increase in traffic on local roads affecting habitats within the designated sites

During Construction and Operation

Effects, Avoidance and Mitigation

F7.84 The Air Quality Assessment at Chapter G identifies up to 10 areas of off-site woodland included on Natural England's Ancient Woodland Inventory which have the potential to be affected by increased nitrogen deposition as a result of increased traffic movements associated with the Proposed Development.

F7.85 The full assessment of the predicted increase in traffic movements on roads in the vicinity of the identified woodland areas is given in Section of 5 of Chapter G (Air Quality). In summary, whilst all the assessed transect points within the woodland areas are expected to experience nitrogen deposition levels that are currently in exceedance of the lower critical load for broadleaved woodland habitat, none are predicted to experience more than a 1% change in nitrogen deposition relative to the lower critical load as a result of the Proposed Development. In addition, none of the points register an increase in nitrogen deposition greater than 0.4kg N/ha/yr – the indicative threshold at which a change in the species-richness of the vegetation at these sites may occur.

Residual Effects

F7.86 As the Proposed Development will not result in an increase in nitrogen deposition greater than 1% of the relevant critical load for the ecological receptors in the vicinity of any of the affected roads, it is concluded that any adverse effects as a result of the Proposed Development are highly unlikely.

F7.87 Furthermore, it should be noted that the actual deposition resulting from the Proposed Development and any associated effect is expected to be lower than that modelled, for reasons including:

1 Improvements to vehicular engines resulting in reduced nitrogen emissions, together with increased uptake of hybrid and electric cars;

2 Policy and legislation leading to reduce vehicular nitrogen emissions, including banning sales of new petrol and diesel engines from 2030, encouraging sales of electric vehicles;

3 Trends in decreasing background nitrogen levels; and

4 It is expected that a comprehensive Travel Plan will be adopted to further reduce traffic arising from the Proposed Development.

F7.88 In view of the above, it is considered highly likely that the additional nitrogen deposition arising from the Proposed Development would have a negligible effect at a local level on the locally designated areas in the vicinity of the Development Site, either alone or in combination with other plans or projects.

Effect 2: Effects of an increase in recreational pressure on habitats and species for which the sites are designated

During Operation only

Effects

F7.89 The construction phase of the Proposed Development is not expected to generate any significant additional recreational pressure on the above listed locally designated sites.

F7.90 With regard to the operational phase, the majority of the designated areas and ancient woodlands in the ZoI are small in size, located at a distance from the Development Site, and separated from the Development Site by main roads and urban areas, with several having no public access. In view of these factors it is considered that these areas are unlikely to form a focus for recreation for residents of the Proposed Development.

F7.91 Designated areas with public access that are potentially more attractive for use by residents of the Proposed Development include larger areas situated close to the Development Site such as Willen Lake LWS, Tongwell Lake LWS, Great Linford BNS and stretches of the Grand Union Canal BNS. These areas are however located within or adjacent to urban areas of Milton Keynes and are already formally managed for public access by Milton Keynes Parks Trust and other bodies. As such it is considered that these areas are unlikely to be adversely affected by additional visitors originating from the Proposed Development.

F7.92 Other smaller areas within the vicinity of the Development Site that may be a focus for recreation include Moulsoe Wood BNS and the adjacent Moulsoe Old Wood, Pond and Scrub BNS. These areas are linked to the Development Site by Public Rights of Way (PRoW) and although no public access is available into the interior of these areas, PRoW are located alongside. Although it is to be expected that some residents of the Proposed Development will incorporate these areas into longer routes for activities such as dog walking, it is considered that these areas are unlikely to be adversely affected by an increase in recreational activity attributed to the Proposed Development due to their small size and distance from the Development Site (a minimum of 1.4km away), and the absence of PRoWs within the BNS areas themselves (PRoWs pass adjacent to the areas only).

F7.93 Furthermore, as described in Section F9.3, the Proposed Development includes provision of extensive areas of informal open space within the linear park and network of green corridors which are expected to form the focus of recreational activities such as dog walking.

F7.94 Existing PRoWs are present within and in the immediate vicinity of the Development Site itself and these would be enhanced through provision of new footpath connections through the Development Site as shown on the Movement and Access Parameters (Appendix C2, Volume 2 of this ES). These would maintain a network of convenient walking routes immediately accessible from the Proposed Development, and it is expected that these would also provide a focus for informal recreational activities.

Avoidance and Mitigation

F7.95 Although any impact of the Proposed Development on these off-site designated areas is expected to be negligible, it is recommended that open space proposals throughout the Development Site are designed to maximise their value for informal recreational activities such as dog walking (while having regard to the requirements to provide undisturbed areas for protected species such as Otter and reptiles, as discussed in Sections F7.201 and F8.46 below), in order to provide an attractive and more immediately accessible alternative to off-site designated areas for recreation.

Residual Effects

F7.96 In view of the above, it is considered certain that any additional use arising from the Proposed Development would have a negligible effect at a local level on the locally designated areas in the vicinity of the Development Site, either alone or in combination with other plans or projects.

Key Ecological Receptor: Network of hedgerows, ditches, scrub, treelines and scattered trees

F7.97 Although individually the hedgerows, ditches, scrub, treelines and scattered trees within the Development Site are considered to be of no more than local interest in their own right, these features combine to provide a substantial amount of habitat forming a network of corridors for the movement of wildlife within and around the Development Site and are considered in combination to be of district value. Associated species include bats, birds, reptiles and invertebrates.

Likely Significant Effects

F7.98 The following potential effects of the Proposed Development have been identified which might, in the absence of mitigation measures, negatively affect the integrity of this receptor:

1 Loss of hedgerows and trees of limited ecological importance in their own right;

2 Severance of existing hedgerow and ditch corridors where crossed by roads/ cycleways/ footpath routes;

3 Direct physical damage to retained hedgerows, trees and scrub and indirect damage through ground compaction, pollution, root severance, ground-level changes and loss of supportive habitat for associated wildlife; and

4 Increased light and noise levels affecting the value of retained hedgerows, ditches, scrub and trees for wildlife.

Effect 1: Loss of hedgerows and trees of limited ecological importance in their own right

During Construction (continuing during Operation)

Effects

F7.99 Overall approximately 18.51km or 65% of the existing hedgerow network will be retained within the proposed development, predominantly within areas of open space and in green corridors around the development areas. Of the hedgerows meeting criteria for consideration as 'important' under the Wildlife and Landscape Criteria of Hedgerow Regulations 1997, it is expected to be possible to retain 27 of the total 35 of these currently present within the site (HTA, pers. comm.), except where there is a need to remove sections of these in order for example to provide crossing points for movement corridors across the site.

F7.100 Although approximately 9.99km or 35% of the existing hedgerow network is expected to be lost to the development, predominantly to allow construction of highways infrastructure works and within development areas, the Illustrative Masterplan provides opportunities to compensate this and enhance the site's hedgerow resource with an additional 12.1km of new hedgerow planting currently depicted, with further opportunities for hedgerow provision remaining (HTA, pers. comm.).

F7.101 In line with the findings of the Tree Survey Report and Arboricultural Impact Assessment (Appendix C6 at Volume 2 to this ES), approximately 73 individual scattered mature trees and 65 tree groups (excluding potential veteran trees which are considered separately from Section F7.124 below) will also be lost or partially lost to the development. These figures exclude trees identified as potential veterans which are considered separately from paragraph F7.124 below. Where hedgerows and trees are expected to be lost, it should be noted that in addition to new hedgerow planting discussed above, the development parameters also allow opportunities for new scrub and tree planting within areas of open space including the linear park, structural landscape planting within road corridors, and new woodlands and orchards in Moulsoe New Wood and within and around the development areas, as indicated on the Illustrative Masterplan (Appendix C3, Volume 2 to this ES).

F7.102 Notwithstanding the new planting opportunities described above, in extreme circumstances (e.g. that replacement planting is not provided) the Proposed Development could potentially result in a permanent significant negative effect at up to a district level on the habitat resource and connectivity provided by these features. Such an effect is however unlikely to occur.

Avoidance and Mitigation

F7.103 In order to maintain the current value of the local hedgerow, scrub, ditch and tree resource for the movement of wildlife and as a habitat resource in its own right it is recommended that:

1 Wherever possible, loss of hedgerows, ditches, scrub and trees should be avoided or minimised, e.g. through use of existing hedgerow gaps for crossing points and pollarding/coppicing of trees alongside crossing points rather than removal;;

2 Crossing points should approach the hedgerow perpendicularly to minimise any hedgerow removal requirement;

3 All hedgerows lost to the Proposed Development should be replaced at a ratio of at least 1:1.25 unless alternative habitat provision would achieve the same nature conservation objectives in terms of habitat provision and connectivity. Opportunities for hedgerow, scrub and tree planting as part of the open space proposals in keeping with the development parameters are illustrated in the Illustrative Masterplan (Appendix C3, Volume 2 to this ES) which includes extensive new hedgerow and other linear planting (e.g. treelines and woodland) within areas of informal open space and within a green network around development areas. In addition, this provides opportunities for creation of ditches and other wetland habitats of high ecological value, such as reedbeds and swales, either as standalone features or as part of the surface water drainage strategy.

4 New hedgerow, tree and scrub planting should be species-rich, using native species typical of the local area, sourced from stock of local provenance where available;

5 Planting should be carried out during the construction phase of the Proposed Development in order to be functional within the early years of the operational phase; and,

6 All retained hedgerows should be enhanced through infilling of gaps and implementation of appropriate management.

Residual Effects

F7.104 Subject to implementation of the above measures, particularly in relation to the provision of new habitats, although there is likely to be a short-term negative effect on this receptor during the construction phase while new habitats establish, no significant loss of habitat resource and opportunities provided by the local hedgerow, ditch and tree network would be expected to occur in the long-term. No negative effects on the nature conservation interest of the Development Site's hedgerow, ditch and tree resource are therefore expected to occur in the long-term at a local level and the overall residual effect on this receptor is expected to be negligible at a local level.

Effect 2: Severance of existing hedgerow and ditch corridors where crossed by roads/ cycleways/ footpath routes

During Construction (continuing during Operation)

Effects

F7.105 In the absence of avoidance and mitigation measures, severance of retained hedgerow and associated ditch corridors by roads, cycleways and footpaths could compromise the ability of the Proposed Development to maintain a coherent network of corridors for the movement of wildlife within and around the Development Site, and may reduce the value of the habitat present in its own right.

F7.106 Assuming a worst-case scenario, in that the integrity of most retained hedgerow corridors are affected simultaneously, the Proposed Development could potentially result in a permanent significant adverse effect at up to a district level on the role that these habitats play in providing ecological connectivity across the Development Site and the wider area, albeit extremely unlikely. Such an effect would generally be permanent but reversible, occurring during the construction phase and continuing throughout the operational phase.

Avoidance and Mitigation

F7.107 In order to avoid significant effects resulting from fragmentation of the hedgerow and ditch network, the following measures should be employed:

1 The number of crossing points should be limited to those essential for movement of cars and people across the Development Site and of the minimum width required for safety;

2 Crossing points should approach the hedgerow perpendicularly to minimise any hedgerow removal requirement;

3 Existing gaps should be used where possible to avoid loss of existing hedgerows, trees, scrub and other habitat of interest;

4 Trees alongside crossing points should be pollarded/coppiced where possible to maximise tree retention;

5 Infilling of existing gaps and provision of complementary habitats to strengthen unaffected sections of hedgerow and maintain a coherent hedgerow network; and,

6 Sensitive use of lighting, and additional planting at crossing points, to minimise effects on nocturnal wildlife and risk of collision with vehicles by raising flight lines of bats and birds (also see Section F7.184).

F7.108 In addition, there are extensive opportunities for creation of new hedgerows and linear habitats secured through the development Parameters as discussed in Sections F9.3-F9.4 below and illustrated on the Illustrative Masterplan (Appendix C3, Volume 2 to this ES). Subject to

appropriate detailed design the Proposed Development would ensure a coherent network of habitat corridors is maintained around the Development Site.

Residual Effects

F7.109 With the above measures in place, it is considered extremely unlikely that there would be any significant loss of habitat connectivity at a local level as a result of providing road, footpath and cycle way crossings through retained hedgerows. The overall residual effect on this receptor is therefore expected to be negligible at a local level.

Effect 3: Direct physical damage to retained hedgerows, trees and scrub and indirect damage through ground compaction, pollution, root severance, ground-level changes and loss of supportive habitat for associated wildlife

During Construction

Effects

F7.110 Construction phase effects on retained hedgerows, scrub and trees may include direct damage, ground compaction, root severance, ground level changes and loss of supportive habitat for associated wildlife as well as indirect effects from dust smothering. Damage to individual trees may adversely affect their longevity or their ability to support wildlife such as roosting bats, nesting birds and invertebrates.

F7.111 Although full details for protection of retained hedgerows and trees are not available at this stage, it is noted that:

1 the majority of retained hedgerows and trees are located within areas of proposed open space as shown on the Green Infrastructure Parameter Plan (Appendix C2, Volume 2 to this ES).

F7.112 Assuming a realistic worst-case scenario, although damage would be near-certain in the absence of avoidance and mitigation measures, such incidents are likely to be localised and temporary, affecting only a small proportion of the existing vegetation, and are likely to be reversible in the medium to long-term.

Avoidance and Mitigation

F7.113 Measures to avoid negative effects of dust on retained vegetation both within and adjacent to the Development Site are described in Chapter G (Air Quality) of the ES and are summarised in Sections F7.46-7.47 above. It is considered that through implementation of these measures, adverse effects of dust smothering on retained trees, scrub and hedgerow habitats during the construction phase can be avoided

F7.114 Works in the vicinity of retained trees, hedgerows and scrub should be carried out in accordance with BS5837: Trees in Relation to Construction [Ref 3], unless otherwise carried out under an Arboricultural Method Statement approved by the Local Planning Authority.

F7.115 The hedgerows and treelines associated with the Development Site mostly sit between intensively farmed arable fields of limited wildlife value with associated semi-natural habitats being limited to narrow strips on either side comprising rough grassland, tall ruderal vegetation, ditches and/ or scattered scrub. It is recommended that corridors of semi-natural habitat that complement the hedgerows and treelines are retained and where possible enhanced through provision of a wider buffer of semi-natural habitats such as rough and/or meadow grassland. The Green Infrastructure Parameter Plan and Illustrative Masterplan (Appendices C2 and C3, Volume 2 to this ES) indicate that this is achievable in many instances. Along with the cessation of deleterious agricultural practices currently associated with the majority of the hedgerows at

the Development Site, such as ploughing and application of agrochemicals, thus improving the rooting areas of the associated hedgerow and trees, the extension of semi-natural habitats would be expected to improve the value of the retained hedgerows and treelines for associated species including bats, birds and invertebrates.

Residual Effects

F7.116 Following implementation of the avoidance measures described above, significant negative effects arising from direct and indirect damage to retained hedgerows, scrub, treelines and individual trees during the construction phase is extremely unlikely on either a district or local level. The residual effect on this receptor is therefore considered to be negligible at a local level.

During Operation

Effects

F7.117 During the operational phase the ecological integrity of retained hedgerows and trees could be compromised where adjacent land uses are inappropriate, for example where a retained hedgerow forms part of a residential curtilage it may be vulnerable to over-management or removal.

F7.118 The magnitude of any such effect is difficult to foresee with any accuracy and the Green Infrastructure Parameter Plan indicates that the majority of retained hedgerows fall within strategic and structural open space, but assuming a worst-case scenario where all retained hedgerows and trees are affected in this manner, this would be likely to have a permanent significant effect at a district level, albeit extremely unlikely.

Avoidance and Mitigation

F7.119 Notwithstanding the above, where possible the following measures should be incorporated into the detailed design for the Proposed Development in order to protect the integrity and maximise the value of the retained hedgerow and tree resource:

1 Retained hedgerows should not form the curtilage of residential dwellings;

2 Retained mature trees should be located outside of residential curtilages;

3 Adequate space to manage retained hedgerows and trees should be maintained between the hedgerow and built development; and

4 Where appropriate, rough grassland hedgerow bases or other habitats of wildlife interest should be maintained to a distance of up to 3m from retained hedgerows.

Residual Effects

F7.120 Following implementation of the avoidance measures described above, significant negative effects arising from direct and indirect damage to retained hedgerows, scrub, treelines and scattered trees during the operational phase of the Proposed Development are extremely unlikely on either a district or local level. The residual effect on this receptor is therefore expected to be negligible at a local level.

Effect 4: Increased light and noise levels affecting the value of retained hedgerows, ditches, scrub and trees for wildlife.

F7.121 The effects of increased light and noise on wildlife using retained hedgerows and trees during the construction and operational phases of the Proposed Development are assessed in relation to specific protected and notable species below in Sections F7 and F8 and as such these effects are therefore not considered further in this section.

Key Ecological Receptor: Potential veteran trees

F7.122 A total of 40 individual trees and two woodland groups considered to be potential veteran trees for the purposes of this assessment are located within the Development Site, including primarily Pedunculate Oak and Ash trees located within hedgerows and woodland pockets throughout the Development Site. The locations of all the potential veteran trees within the Development Site are identified within the Tree Survey Report and Arboricultural Impact Assessment (Appendix C6, Volume 2 to this ES). No ancient, or potentially ancient, trees have been identified within the Development Site. The potential veteran trees are considered to be of low district value in combination due to their longevity and value for a range of species and are considered separately in this assessment to the other scattered trees, tree lines and woodland trees discussed from Section F7.97 above and from Section F8.4 below, in view of planning policy and Natural England Standing Advice which recognises veteran trees as 'irreplaceable' features. Individually the trees are considered to be of no more than low local value in isolation.

Likely Significant Effects

F7.123 The development parameters indicate that although it will be possible to retain the majority of potential veteran trees within the development, it will not be possible to avoid loss of 11 individual trees which are expected to be directly impacted by highways infrastructure proposals or within development areas.

F7.124 The remainder of the potential veteran trees will be retained within the network of greenspace where effects may also be generated. Effects on potential veteran trees arising from the development therefore include:

1 Direct loss of potential veteran trees and deterioration of retained trees through loss and damage to associated habitat.

2 Direct or indirect physical damage to retained potential veteran trees through ground compaction, pollution, root severance and ground-level changes during the construction phase; and

3 Increased light and noise levels affecting the value of retained potential veteran trees for wildlife during the construction and operational phases.

F7.125 These potential effects are considered below, together with details of appropriate avoidance, reduction, mitigation and enhancement measures, as applicable.

Effect 1: Direct loss of potential veteran trees and deterioration of retained trees through loss and damage to associated habitat

During Construction and Operation

Effects

F7.126 The development parameters secure the retention of the majority of potential veteran trees within areas of open space, affording opportunity for suitable standoff buffers from adjacent development in line with the advice of the Tree Survey Report and Arboricultural Impact Assessment (Appendix C6, Volume 2 to this ES) and retention or creation of supportive habitat. This will ensure that a high proportion of the habitat associated with these trees, such as cracks, crevices and deadwood is maintained, together with their ability to support associated species such as bats, birds and invertebrates.

F7.127 Where 11 potential veteran trees are lost as a result of the development, with the exception of one Oak tree these relate primarily to Ash trees, some of which may be expected to be lost within a relatively short timeframe due to their structural condition and the effects of Ash dieback

which is prevalent within Milton Keynes, and the structural condition of the Apple tree which has a limited residual life expectancy.

F7.128 Although the potential veteran trees to be lost are of limited interest from an ecological perspective as individuals, in the absence of mitigation there will nevertheless be a reduction in the overall deadwood and other habitat resource provided by these trees.

F7.129 For the potential veteran trees to be retained, there will also be a risk of a loss of valuable veteran features such as rotten and dead limbs, through arboricultural management for health and safety where these trees are located close to development areas or publicly accessible open areas, roads, cycleways and footpaths during the construction and operational phases.

F7.130 The loss of hedgerow sections and areas of woodland, scrub and rough grassland hedgerow bases from the vicinity of retained potential veteran trees could also result in an overall reduction in the extent of supporting habitat currently complementing these trees.

F7.131 In addition, during the operational phase the ecological integrity of retained potential veteran trees could be compromised where inappropriate levels or types of recreation beneath the trees results in soil compaction, poor establishment of complementary semi-natural habitats or pressure for tree safety works.

F7.132 In the absence of mitigation, a reduction in the overall habitat resource from the Development Site through the loss of potential veteran trees and deterioration of retained trees would be expected to affect the overall integrity of the receptor as a whole and its ability to support notable associated species. In the absence of avoidance, mitigation and compensation measures, the effect of this loss is expected to constitute a long-term negative effect at a district level.

Avoidance and Mitigation

F7.133 In order to avoid and mitigate the effects of loss of potential veteran trees from the Development Site and deterioration of retained trees through loss of supportive habitat, the following measures are recommended:

1 Wherever possible, loss of potential veteran trees should be avoided through sensitive detailed design of development parcels and open space proposals, with a suitable buffer maintained from adjacent development around the tree.

2 Where retention of potential veteran trees is not possible, for the most valuable and viable specimens, these trees should be transplanted to unaffected areas of the Development Site. Where this is not possible, the tree should be used for provision of fallen deadwood habitat within an area of informal greenspace (this could be extended to arisings from other tree management works elsewhere in the Development Site).

3 Buffer zones should be free of development, located outside of residential curtilages, and comprise retained or newly created semi-natural habitats such as rough and meadow grassland in order to provide opportunities for associated wildlife such as foraging bats and pollening/ nectaring invertebrates. In most instances new tree planting should be avoided within the buffer zones.

4 Corridors of habitat should be retained or created between the potential veteran trees and the wider habitat network.

5 The Green Infrastructure Parameter Plan and detailed Highways Infrastructure proposals indicate that the majority of retained potential veteran trees fall within strategic and structural open space. Notwithstanding this, in heavily trafficked areas consideration should be given to use of fencing (or other barriers to movement) around veteran trees to

avoid need for tree safety works. Further measures to dissuade regular use of the buffer zones could include access control measures such as strategic placement of fallen limbs/ arisings from tree management elsewhere within the Development Site, and provision of educational materials such as interpretative signage to encourage responsible enjoyment.

6 A veteran tree management strategy should be prepared as part of a Landscape and Ecological Management Plan (LEMP) at an appropriate stage to secure the long-term management of retained and any transplanted potential veteran trees. This could include the following:

i Management of high-quality standard trees and planting of new native trees to ensure future generations of mature and veteran trees;

ii Implementation of 'haloing' around mature and potential veteran trees to remove competing young trees and scrub and ensure successive generations of veteran trees;

iii 'Veteranisation' of selected retained semi-mature and mature trees within the Development Site through the use of coronet cuts or bark-ringing to promote additional deadwood and woodland structural diversity; and

iv Creation of sap runs on other trees to provide an additional foraging resource for invertebrates.

F7.134 In addition to the above, the Green Infrastructure Parameters secure the provision of substantial areas of new woodland, structural landscape planting and new areas of informal open greenspace within the linear park, along the M1 buffer and within a network of green corridors around the development areas. These provide opportunities for a substantial amount (in the region of 43.5haha) of new woodland planting plus extensive standard tree planting throughout the Development as indicated on the Illustrative Masterplan (Appendix C3, Volume 2 to this ES). In the long-term this would be expected to increase the resource of mature and veteran trees at the Development Site.

Residual Effects

F7.135 Although there is expected to be a medium-term negative effect on potential veteran tree habitats and associated species arising during the construction phase, when key habitat is lost and before new and enhanced habitat becomes established, in the long-term, following implementation of the avoidance and mitigation measures described above, significant negative effects are extremely unlikely at a district or local level. The residual effect is therefore expected to be negligible at a local level.

Effect 2: Direct or indirect physical damage to retained potential veteran trees through ground compaction, pollution, root severance and ground-level changes

<u>During Construction Only</u>

Effects

F7.136 With the exception of limited works including creation of new footpaths and cycleways, no new hard landscaping, ground level changes or buildings will be constructed within the buffer zones] of the retained potential veteran trees. In the absence of avoidance and mitigation measures however, construction phase effects may include direct damage, ground compaction, pollution and root severance. In the absence of mitigation, this damage may adversely affect the longevity of the trees. Such incidents are however more likely to be temporary and are likely to be reversible in the medium to long-term.

Avoidance and Mitigation

F7.137 Measures should be employed during the construction period to avoid damage to potential veteran trees in accordance with the current BS5837 'Trees in relation to construction' and Natural England Standing Advice, which affords extended 'buffer zones' to veteran trees. This should include use of tree protection fencing around RPAs/buffer zones, responsible storage of materials and construction practice e.g. no fires within 20m of the trunk of a retained tree. These measures should be detailed within an Arboricultural Method Statement to be secured by condition.

F7.138 Where appropriate, works in the vicinity of potential veteran trees should also be subject to the wider recommendations contained within Natural England Standing Advice (F12.18) which generally precludes new hard landscaping, ground level changes or buildings within the buffer zone of veteran trees. If an incursion into the extended buffer afforded to the potential veteran trees is proposed at the detailed design stage, the advice of a suitably qualified arboriculturalist and ecologist should be sought to ensure that no loss or deterioration of the tree will arise. This may include measures such as redesign to avoid any such incursion, extension of the buffer elsewhere to ensure continued provision of complementary habitats, use of no-dig or innovative construction techniques and/or compensatory measures to improve the integrity of the tree.

F7.139 Negative effects of dust on potential veteran trees should be avoided through implementation of the dust control measures during construction works set out in Sections F7.46-7.47 above.

Residual Effects

F7.140 With the above measures in place, it is certain that the proposed construction activities would have a negligible effect on the integrity of the retained potential veteran trees at a site level.

Effect 3: Increased light and noise levels affecting the value of retained veteran trees for wildlife

F7.141 The effects of increased light and noise on wildlife using retained hedgerows and trees during the construction and operational phases of the Proposed Development are assessed in relation to specific protected and notable species below in Sections F7 and F8. These measures should be applied to proposals in the vicinity of veteran trees and as such these effects are therefore not considered further in this section.

Key Ecological Receptor: Stream in east of site and network of ponds (outside of Pineham Nature Reserve)

F7.142 Outside the Pineham Nature Reserve (considered under the River Ouzel and Broughton Brook MKWC assessment from Section F7.3 above), waterbodies within the Development Site include several small, shallow, and predominantly ephemeral ponds on field boundaries. Also considered in this section is the small un-named seasonal stream which flows westwards through the eastern part of the Development Site and constitutes a tributary of the River Ouzel. The value of these wetland areas is currently compromised by either a lack of management, low water levels, heavy shading suppressing growth of marginal vegetation, pollution through agricultural runoff, or, in the case of the stream, unsympathetic management resulting in artificially profiled steep-sided banks resulting in a trapezoidal channel and culverted sections at field access points.

F7.143 Although the ponds and stream do not represent high quality examples of these habitat types, they provide habitat for a range of species and increase the diversity of the Development Site as well as providing corridors for the movement of aquatic species through the Development Site. The ponds also broadly qualify as Habitats of Principal Importance under Section 41 of the 2006

NERC Act. In view of the above these wetland areas in combination are considered to have value at a district level.

Likely Significant Effects

F7.144 The Green Infrastructure Parameters Plan indicates that the majority of the ponds will be lost from the Development Site (with the exception of those located within Pineham Nature Reserve discussed above). With the exception of two new road crossings, the eastern stream will however be retained within a minimum 30m wide corridor of green space.

F7.145 In the absence of avoidance and mitigation measures, the development has potential to affect the integrity of the existing wetland resource of the Development Site through:

1 Direct loss of pond habitats and loss of connectivity where the stream is crossed by roads;

2 Adverse effects on the quality and quantity of water entering the waterbodies and continuity of the flow of the eastern stream; and

3 Increased noise and light disturbance to wildlife currently using the waterbodies.

F7.146 These potential effects are assessed below.

Effect 1: Direct loss of pond habitats and loss of connectivity where the stream is crossed by roads

During Construction (continuing during Operation)

Effects

F7.147 The development parameters indicate the loss of a up to 4 ponds of ponds from the site, and although the design of the road network through the Development Site has sought to utilise existing culverted sections for road crossings where possible, the existing culverted sections on the eastern stream will need to be extended. The effects of the loss of these ponds and a further reduction in connectivity along the eastern stream, which would arise during the construction phase and continue throughout the operational phase, are in the absence of mitigation expected to be a certain permanent negative effect at a district level.

Avoidance and Mitigation

F7.148 In order to avoid significant effects resulting from further loss of habitat connectivity along the eastern stream, the following measures should be employed:

1 The number of crossing points should be limited to those essential for movement across the Development Site and of the minimum width required for safety;

2 Existing culverted points should be used where possible;

3 Crossing points should approach the stream perpendicularly to minimise the extent of culverted sections;

4 New and replacement culverts should be designed to allow the safe passage of wildlife; and

5 Lighting used at the crossing points should be sensitively designed to minimise effects on nocturnal wildlife and planting provided (or existing vegetation managed) to reduce risk of collision of vehicles with bats and birds by raising flight lines (also see Section F7.184).

F7.149 In line with the Green Infrastructure Parameters, a minimum 6m standoff will be retained between the eastern stream and adjacent development areas within which no built development will occur (with the exception of footpaths/cycleways and the two access road crossings). This buffer would be established as a strip of open greenspace which provides opportunity for establishment of complementary habitats such as species-rich meadow grassland and scrub.

Enhancement of the retained stream could also be achieved through measures including selective thinning of overshading vegetation to increase light levels along margins, reprofiling of the stream banks to create a more natural profile and encourage the establishment of more diverse wet grassland and aquatic and marginal vegetation habitats, and design of a hydrological scheme and management strategy that would result in higher water levels within the stream and continuity of flow.

F7.150 Where possible, the detailed design should seek to retain existing ponds together with maintenance and, where appropriate, enhancement of associated terrestrial habitats together with connective habitats to allow movement of wildlife between wetland features.

F7.151 New ponds and other wetland habitats should be provided to mitigate the loss of the existing ponds from the Development Site, some of which could be located to complement other areas of retained wetland habitat within the Pineham Nature Reserve (see Section F7.229below). The Green Infrastructure Parameters allow for the creation of ponds and other new wetland features and complementary habitats in accordance with the proposed SuDS scheme and open space strategy.

F7.152 The Illustrative Masterplan (Appendix C3, Volume 2 to this ES) shows how extensive areas of new wetland habitat could be delivered within the development, including as stand-alone features within the linear park and as part of the SuDS network. In order to maximise opportunities for wildlife, these should include a variety of habitats such as permanent and ephemeral standing open water, reedbeds, sedgebeds, marginal habitats and wet grassland.

Residual Effects

F7.153 In view of the degraded nature of the existing ponds and stream and subject to implementation of the avoidance and mitigation measures proposed above, no measurable negative effect on opportunities provided by these wetland habitats would be expected to occur during the construction or operational phases of the development and the residual effect is near certain to be negligible at a local level.

F7.154 The development parameters allow for the creation of extensive areas of new wetland habitat, both as part of the surface water drainage scheme and as stand-alone features, as indicated on the Illustrative Masterplan. Subject to appropriate design, these habitat creation and enhancement works could in fact provide substantial benefits to the wetland resource of the Development Site and its surrounds, through increasing the extent, quality and diversity of habitats present.

Effect 2: Adverse effects on the quality and quantity of water entering the wetlands and continuity of the flow of the eastern stream

<u>During Construction and Operation</u>

Effects

F7.155 In the absence of mitigation, construction of the Proposed Development has the potential to adversely alter the supply and/ or quality of water entering the retained ponds and watercourse during the construction and operational phases through factors such as a greater variability in the rate of supply to the watercourse or increased drying, or through inadequately contained pollution incidents/ sediment run-off. These incidents would have the potential to cause damage to wetland and riparian habitats within and downstream of the Development Site and such effects may constitute a significant negative effect on these receptors at a district level. Depending on the nature and extent of the incident, any such incidents have the potential to be permanent and irreversible although lesser effects are much more likely.

Avoidance and Mitigation

F7.156 Measures to be implemented to avoid and mitigate the effects of the Proposed Development on the quality, quantity and continuity of water in the River Ouzel and Broughton Brook during both the construction and operational phases of the Proposed Development are detailed from Section F7.10 above. These measures focus on carrying out construction activities in line with measures set out in Chapter L (Water Environment and Drainage) and a CEMP that will be prepared for the Proposed Development, and establishment of a surface water drainage strategy and SuDS features to reduce the risk of pollution incidents during the construction and operational phases. Where applicable, the same measures should be implemented in relation to the retained ponds and eastern stream.

Residual Effects

F7.157 Subject to the implementation of avoidance and mitigation measures summarised above and detailed from Section F7.10 and Chapter L, significant residual negative effects on the retained ponds and eastern stream as a result of effects on quality, quantity and constancy of water are extremely unlikely at the local level and the overall residual effect is expected to be negligible at a local level.

Effect 3: Increased noise and light disturbance to wildlife currently using the waterbodies

F7.158 The effects of increased light and noise on wildlife using retained and newly created ponds and the eastern stream during the construction and operational phases of the Proposed Development are assessed in relation to specific protected and notable species below in Sections F7 and F8 and as such these effects are therefore not considered further in this section.

Key Ecological Receptor: Bats

Roosting bats

F7.159 As detailed in Section F4.50 and Appendices F6-7 a number of the buildings, trees and structures within the Development Site support roosting bats. The majority of the roosts recorded are considered to relate to low-status non-breeding roosts for individual/ low numbers of Common and Soprano Pipistrelle, Serotine and Noctule bats, however Daubenton's bat maternity roosts have also been identified within three bridges under the M1.

F7.160 As discussed in SectionF3.29 due to timing of instruction and subsequent evolution of the development proposals, at the time of writing several of the buildings and trees containing bat roosts have not yet been subject to the requisite number of Phase 2 surveys in line with best practice guidance [Ref 1]. As such the status of these roosts cannot be considered confirmed until further surveys have taken place (see below). In addition, a number of other buildings and trees now included in the current site boundary and potentially affected by the proposed works have been identified as having low or higher potential but have not yet been subject to Phase 2 survey due to timing of instruction. In view of these limitations, this assessment takes a precautionary approach with measures to overcome these limitations detailed below.

F7.161 Based on the number and status of the bat roosts confirmed to be present at the Development Site to date, and the potential for bats to be present within features not yet subject to survey, it is considered that the Development Site has value for roosting bats at up to a high local level.

Foraging and commuting bats

F7.162 At least ten bat species were recorded using the Development Site on at least an occasional basis for foraging and commuting including Common and Soprano Pipistrelle and Noctule bats, with

Myotis sp., Brown Long-eared bat, Serotine and Leisler's bats also recorded at lower frequencies. The rarest species of bats recorded using the Development Site are Barbastelle, Nathusius' Pipistrelle and Greater Horseshoe bats, all of which were recorded at very low frequencies and considered to be using the Development Site as part of a much wider foraging territory. Taking into account the level of activity recorded over the Development Site relative to its size and the extent of valuable habitat present in the Development Site, which includes the River Ouzel, the Pineham Nature Reserve and the woodland copses and hedgerow network, the Development Site is considered to be of value for foraging and commuting bats at a low district level.

Likely Significant Effects

F7.163 The development parameters indicate that at least nine bat roosts will be lost as a result of the proposals. In addition, removal of buildings and trees not found to support roosting bats to date but containing suitable features will reduce opportunities for future colonisation of these features by roosting bats, and loss of hedgerows, trees, wetlands and woodland habitats has the potential to affect foraging and commuting bats and retained roost sites.

F7.164 Potentially significant adverse effects on bats arising from the Proposed Development are therefore:

1 Injury/ mortality of roosting bats, destruction or abandonment of roosts and loss of bat roost opportunities through building demolition and felling of trees with bat roost potential.

2 Mortality of foraging/ commuting bats and effects on foraging and commuting habitat through habitat loss and fragmentation and increased light levels.

F7.165 These are discussed below, together with details of appropriate avoidance, reduction, mitigation and enhancement measures, as applicable.

Effect 1: Injury/ mortality of roosting bats, destruction or abandonment of roosts and loss of bat roosting opportunities

During Construction and Operation

Effects

F7.166 The development Parameters (Appendix C2, Volume 2 to this ES) indicate that the following identified bat roosts will be lost as a result of the proposals:

1 Occasional/transitory roosts for individual Common Pipistrelle bats within B2, B3, B27, T18 and T29;

2 Occasional/transitory roosts for two Soprano Pipistrelle, one Serotine and one further *Pipistrellus* bat within B33-G;

3 A small maternity roost for Common Pipistrelle bats within B33-C, B33-G, B33-H and B33-L;

4 An occasional/transitory roost for two bats of indeterminate species in T17; and

5 A day roost for an individual *Pipistrellus* bat within T71.

F7.167 It should be noted however that since the bat survey work was carried out subsequent changes to the masterplan indicate that one building (B37) and three trees/ tree groups (T170, 171, G4) with at least moderate potential to support roosting bats that have not surveyed to date may be affected by the proposed works.

F7.168 In addition, a number of buildings and trees having potential to support roosting bats but not found to support active roost sites to date are expected to be lost, through site clearance for

development, or as a result of health and safety management works to trees. In the absence of mitigation, the loss of the above active roosts (known roosts), potential roosts (in features not yet subject to Phase 2 survey) and other roosting opportunities (where bats have found to be absent) would be near certain to result in an adverse effect on bats at local level through a reduction in the availability of roosting habitat from the Development Site.

F7.169 In addition, as bat roosts are to be lost, it will be necessary to avoid injury or killing of bats to comply with nature conservation legislation and maintain the favourable conservation status of bats within the Development Site and wider area.

Avoidance and Mitigation

F7.170 A detailed description of measures to mitigate the effects of the Proposed Development on bats is given in the bat survey reports in Appendices F6-7. This gives consideration to replacement of the lost roost sites identified to date, timing of works and suitable working practices for demolition/ felling of roost sites. Key elements are identified below together with further consideration of the effects of the Proposed Development on future opportunities at the Development Site for roosting bats. The mitigation and avoidance measures outlined should be subject to review and potentially extension following supplementation of the Phase 2 bat roost survey to include additional trees now affected by the proposed works which have not yet been subject to survey, further survey work on confirmed roosts not yet subject to the requisite number of surveys, and any other updated survey work carried out prior to each phase of the development commencing.

F7.171 Further survey work should comprise either Phase 2 emergence/re-entry surveys or climbed inspections (where safe to do so) of additional trees with moderate or higher potential to support roosting bats that are affected by the latest proposals. This work should be carried out prior to determination of the application. Trees with 'low' potential to support roosting bats would not require further survey at the application stage [Ref 1].

F7.172 To provide replacement opportunities for bats associated with the affected roost sites prior to construction commencing, bat boxes should be installed on suitable retained trees within the Development Site in the vicinity of the existing roosts to be lost. Initial replacement roost mitigation for the roosts to be lost are outlined in the bat survey reports in Appendices F6-7. The bat boxes described would mitigate for the loss of bat roosting opportunities during the site clearance/demolition works and would be retained on completion of the Proposed Development in addition to the permanent roost features provided in new buildings (see below).

F7.173 Following demolition/site clearance, measures to ensure the long-term availability of roost sites should be incorporated within new buildings across the Development Site. Suitable features to be included within the Proposed Development proportionate to current understanding of the roosts affected are described in the bat survey reports in Appendices F6-7. In summary, such features would include:

1 Dedicated features such as Schwegler 1FR Bat Tubes or 'Habibat' type boxes incorporated into south- to west-facing elevations of new buildings;

2 Dedicated features specifically suitable for year-round occupation (including maternity) such as 1WI Schwegler Summer and Winter Bat Boxes incorporated into north- to east-facing elevations of the new buildings;

3 Provision of 20mm x 100mm gaps beneath roof and ridge tiles to allow access by bats to the underfelt below. Alternatively dedicated bat access tiles could be installed to perform a similar function;

4 Provision of 20mm x 200mm gaps along soffit boards providing access to the soffit box (installing soffit bat boxes if desired) or the internal roof space where appropriate;

5 Provision of further bat boxes on buildings such as 2FE Schwegler Wall-Mounted Bat Shelter, Beaumaris Woodstone Bat Box or Eco Kent Bat Box; and/or

6 Provision of further bat boxes on trees such as Vincent Pro Bat Box or Miramare Bat Box.

F7.174 Unless further survey indicates otherwise, demolition/ tree felling works affecting the recorded roosts should be carried out during spring or autumn to avoid the times of year when bats are most susceptible to disturbance and be carried out using suitable working practices to avoid death or injury of any bats present (detailed in Appendices F6-7). Where appropriate these works should be informed by updated surveys/monitoring of recorded roosts in order to ensure that the mitigation measures reflect the status of bats at the time of development, and extension of the Phase 2 roost survey to additional buildings/ or trees affected by the proposed works which have not yet been subject to survey. All works affecting bat roosts will need to be carried out under a European Protected Species (EPS) licence, to be obtained from Natural England. Further details of mitigation to protect roosting bats at the Development Site are provided in Appendices F6-7.

F7.175 The above measures should be extended in a proportionate manner to mitigate for works affecting any additional roosts recorded during completion of the Phase 2 bat survey work.

F7.176 The Proposed Development would provide opportunities to create new roost sites on new buildings and bridges and retained trees in addition to those prescribed for replacement of the bat roosts being lost, which would increase opportunities for roosting bats at the Development Site. The specification and location of other bat boxes and features should be determined during detailed design, through consultation with an appropriately qualified and experienced bat ecologist.

F7.177 The integrity of retained roosting opportunities and replacement roost sites should also be secured in the long-term through the maintenance of connections to commuting and foraging habitat and sensitive use of lighting throughout the construction and operational phases. Pending agreement with Natural England over the location of the replacement roost features, the Green Infrastructure Parameters indicate that this is achievable.

Residual Effects

F7.178 Through implementation of the above measures to protect individual bats during construction and maintain roosting opportunities within the Proposed Development, no adverse effect on the favourable conservation status of the local bat population would be expected to arise. Proportionate extension of such measures would be appropriate to mitigate for any additional affected roosts recorded during the completion of the ongoing Phase 2 bat survey work. It is therefore considered near certain that the residual effect on roosting bats during the construction and operational phases would be negligible at the site level.

Effect 2: Mortality of foraging/ commuting bats and effects on foraging and commuting habitat through habitat loss and fragmentation and increased light levels

<u>During Construction and Operation</u>

Effects

F7.179 In the absence of avoidance and mitigation measures, loss of habitats from the Development Site currently used by foraging and commuting bats could both reduce the amount of habitat

available as a whole and reduce the ability of these features to provide a network of corridors for the movement of bats within and around the Development Site.

F7.180 During the construction and operational phases, fragmentation by roads of habitat corridors used by foraging and commuting bats, and unsympathetic lighting within or adjacent to retained bat foraging and commuting habitat, including the river corridors, woodlands, hedgerows, mature trees and scrub could also lead to a higher incidence of bat mortality through collisions at road crossings and an overall decrease in the available habitat for foraging and commuting bats, particularly for light-intolerant species.

F7.181 Assuming a worst-case scenario, in that the integrity of all suitable habitats within the Development Site were affected simultaneously, this would be likely to result in an adverse effect at a low district level, albeit extremely unlikely to occur. Such an effect would generally be long-term but reversible, occurring during the construction phase and continuing throughout the operational phase.

Avoidance and Mitigation

F7.182 The development of the site will result in the loss of limited areas of foraging habitat within the development areas where buildings and hardstanding take the place of hedgerows and field margins, woodland, mature trees, rough grassland, ponds and ditches. A network of features suitable for foraging and commuting bats will however be retained within the Proposed Development as shown on the Green Infrastructure Parameter Plan, this includes the retention of woodland, hedgerows and mature trees around the site, maintenance of strong habitat corridors along the river corridors and M1 corridor, provision of new woodland within Moulsoe New Wood, and a number of other new green corridors passing through and around development areas.

F7.183 Where appropriate, the following measures should also be implemented to avoid bat mortality and maintain favourable conditions and maximise new opportunities for foraging and commuting bats:

1 Use of nectar and pollen-rich species in planting schemes in order to increase abundance of invertebrate prey;

2 Sympathetic retention of existing vegetation and new landscape planting where habitat corridors are crossed by roads, including establishment of standard trees at strategic locations, to raise the flight path of commuting bats where possible; and

3 Avoidance of lighting beyond the minimum level required for safety where roads cross through or pass adjacent to existing and newly created commuting and foraging habitats.

F7.184 In order to maintain the integrity of retained and new bat foraging and commuting habitat at the site, the following external lighting measures summarising those given within the Bat Survey Report (Appendices F6-7) should be implemented during the construction and operational phases of the Proposed Development:

1 Avoidance of night-time illumination of areas of retained bat foraging and commuting habitats (including woodland, watercourses, hedgerows, scrub and mature trees) throughout the construction phase by establishing site compounds, floodlighting and security lighting away from these habitats and using directional and hooded lighting to avoid light spill into these areas;

2 Use of only the minimum amount of light required for safety and amenity, and minimise upward reflected light;

3 Avoidance of bare bulbs or upward-pointing lights. The spread of light should be kept near to or below the horizontal;

4 Use of narrow spectrum bulbs and/or low UV emitting bulb types;

5 Avoidance of light-spill into non-target areas through luminaire design or with accessories, such as hoods, cowls, louvers and shields to direct the light;

6 Minimisation of the height of lighting columns;

7 For pedestrian lighting, use of low-level lighting that is as directional as possible and below 3 lux at ground level;

8 Where necessary, use of embedded road lights to illuminate roadways and light only high-risk stretches of roads such as crossings and merges; and

9 Use of timers, dimmers and motion sensors to maintain dark/darker periods when lighting is not/least required.

F7.185 It is recommended that the lighting scheme for the operational phase of the Proposed Development is reviewed by a suitably qualified ecologist at the detailed design stage to ensure that no adverse effects on bat foraging and commuting habitat and other ecologically sensitive areas is likely to arise.

F7.186 The new areas of informal open space proposed within the site will provide extensive habitat creation opportunities as identified in the Illustrative Masterplan (Appendix C3, Volume 2 to this ES) and discussed in Section F9.3 below. Subject to appropriate design this has the potential to provide substantial enhancements to the resource of bat foraging and commuting habitat within the site in the long-term

Residual Effects

F7.187 Following the implementation of the measures described above, adverse effects on foraging and commuting bats arising from loss and fragmentation of habitat and increased lighting during the construction and operational phases would be expected to be avoided and the overall residual effect on foraging and commuting bats is near certain to be negligible at a local level. Subject to appropriate design of new key habitat corridors and informal open spaces, the development may provide enhanced foraging habitat for bats in the long-term.

Key Ecological Receptor: Otter

F7.188 Otters have been recorded using the River Ouzel within the site. This watercourse, and the tributary Broughton Brook, provide potential hunting opportunities for Otter while the scrub and trees growing along the edges of the river provide potential habitat for laying-up sites or temporary holts (although no evidence of such use was recorded), as well as a sheltered passage for movement. Although Otters generally have a large home range and it is highly likely that the section of river associated with the site forms only a small part of a larger Otter territory, the site is considered to be of up to district importance for this species.

Likely Significant Effects

F7.189 Construction and operation of the Proposed Development has the potential to adversely affect individual Otters and the integrity of the watercourses and riparian habitat within the site that provide habitat for this species. The following potentially significant effects of the Proposed Development on Otter have been identified:

1 Risk of injury to/mortality of individual Otters during construction of new road and foot/cycleway crossings;

2 Fragmentation of River Ouzel corridor and increase in road traffic accidents through new road crossings;

3 Degradation of habitat through waterborne pollution entering the River Ouzel/ Broughton Brook watercourses or alterations to the quantity/ continuity of flow; and

4 Disturbance to habitat along the river corridors corridor due to construction and operational phase noise, lighting and human activity.

F7.190 These are discussed below, together with details of appropriate avoidance, reduction, mitigation and enhancement measures, as applicable.

Effect 1: Risk of injury to/mortality of individual Otters during construction of new road and foot/cycleway crossings

During Construction Only

Effects

F7.191 One possible off-site Otter lying up site or holt was recorded in the vicinity of the site, located on the River Ouzel approximately 50m to the west of the Tongwell Street bridge in the south of the site. This feature is located outside the site boundary and is not expected to be directly affected by the proposed new Tongwell Street bridge construction during the survey however there is the potential for disturbance of any Otters present during the bridge construction works.

F7.192 No other Otter holts have been recorded in the sections of the River Ouzel to be affected by the proposed new road and foot/cycleway crossings and as such there is expected to be minimal risk of direct injury or mortality of Otters as a result of construction of the Proposed Development. However, this species is a highly mobile mammal and it is conceivable that a new Otter holt could be established ahead of construction commencing at any of the points of the new bridge crossings which, in the absence of mitigation, has the potential to result in the injury or mortality of any individual Otters present during the construction phase.

F7.193 Although disturbance, injury or mortality of individual Otters is not expected to constitute a significant effect at a local or district level, it will be necessary to avoid disturbance, injury or killing of any Otters and Water Voles present to comply with nature conservation legislation.

Avoidance and Mitigation

F7.194 In the event that it is not possible to avoid disturbance to Otters occupying the identified lying up site/holt, a Natural England licence should be obtained for closure of the holt prior to works commencing. Any such licence application would need to be supported by a Method Statement detailing measures to protect animals and the favourable conservation status of local populations through appropriate working practices and timing of works.

F7.195 In accordance with the methodologies described in the Water Vole and Otter survey reports provided in Appendices F9-10, it is recommended that the sections of the river to be affected by the works are inspected by a suitably qualified ecologist prior to works commencing in order to confirm locations of any previously identified or new Otter holts, and where necessary, that vegetation is removed by hand under the supervision of a suitably qualified ecologist to search for any burrows that might not otherwise have been visible. Similarly, any sections of riverbank proposed for enhancement such as reprofiling or creation of backwaters should be checked prior to works commencing.

Residual Effects

F7.196 Subject to implementation of the above proposed measures to avoid disturbance and injury to/ mortality of Otters during construction, it is considered extremely unlikely that significant effects on Otters at a local level would occur as a result of the Proposed Development. Any residual effect is therefore expected to be negligible at a local level.

Effect 2: Fragmentation of River Ouzel corridor and increase in road traffic accidents through new road crossings

During Construction (continuing during Operation)

Effects

F7.197 In the event of inappropriate design, the proposed new road crossings over the River Ouzel corridor have the potential to impede the movement of Otters along the river corridor by creating a barrier to movement, particularly at times of flood. In addition to reduction in ecological connectivity this could result in increased risk of killing and injury of individual animals as a result of road traffic accidents. This effect would arise during the construction phase and continue throughout the operation of the Proposed Development. In the absence of mitigation this effect would be permanent and, assuming no other suitable corridors exist, in extreme circumstances, significant at a local level. Such a significant effect is however considered extremely unlikely in view that flood periods are temporary and overland access would maintain a degree of habitat connectivity (albeit with a risk of road traffic accidents).

Avoidance and Mitigation

F7.198 Avoidance and mitigation measures to maintain the continuity of habitat for Otters along the River Ouzel throughout the construction and operational phases include:

1 The section of river corridor affected by the new road crossing has been minimised by appropriate design.

2 The new road bridges have been sensitively designed to allow passage of wildlife beneath and outside of the aquatic zone in all but extreme flood events, including incorporation of mammal ledges and continuation of marginal vegetation along the watercourse beneath the bridges where possible; and

3 The use of lighting at the river corridor crossing points should be restricted to the minimum level required for safety during the construction and operational phases to retain a dark corridor for Otters moving up and down the river (see Section F7.184 above).

F7.199 The above measures are expected to reduce the likelihood of Otters crossing over the road carriageways and therefore minimise the risk of increased mortality through road traffic accidents. A new mammal ledge proposed below the retained Tongwell Street bridge is expected to provide enhancements to the existing situation which currently has no provision for safe passage of mammals below the bridge at times of flood.

F7.200 The development parameters provide opportunity to enhance the connectivity of the river corridor for Otters through additional scrub and tree planting within the linear park to provide additional cover for movement, and measures to enhance marginal vegetation and provide complementary wetland habitats to provide additional habitat as discussed in Section F9.3. In addition, provision of an artificial Otter holt at an appropriate undisturbed location within the linear park will provide further opportunities for Otters.

Residual Effects

F7.201 Subject to the implementation of the above mitigation and enhancement measures it is extremely unlikely that any significant residual loss of habitat connectivity would occur at a local level as a result of the proposed road crossing and new bridges over the River Ouzel. The overall residual effect on Otters is therefore expected to be negligible at a local level.

Effect 3: Degradation of habitat through waterborne pollution entering the River Ouzel/ Broughton Brook watercourses or alterations to the quantity/ continuity of flow

During Construction and Operation

Effects

F7.202 In the absence of mitigation, construction of the Proposed Development has the potential to adversely alter the supply and/ or quality of water entering the watercourses within the site during the construction and operational phases through factors such as a greater variability in the rate of supply to the watercourse or increased drying, or through inadequately contained pollution incidents/ sediment run-off. These incidents would have the potential to cause damage to wetland and riparian habitats within and downstream of the site and could result in a reduction in prey for Otters. Such effects may constitute a significant negative effect at a district level. Depending on the nature and extent of the incident, any such incidents have the potential to be permanent and irreversible although lesser effects are much more likely.

Avoidance and Mitigation

F7.203 Measures to avoid and mitigate the effects of the Proposed Development on the quality, quantity and continuity of water in the River Ouzel and Broughton Brook during both the construction and operational phases of the Proposed Development are detailed in Sections F7.46-47 above. These measures focus on carrying out construction activities in line with measures set out in Chapter L (Water Environment and Drainage) and a CEMP that will be prepared for the Proposed Development, and establishment of a surface water drainage strategy and SuDS features to minimise the risk of pollution incidents during the construction and operational phases.

Residual Effects

F7.204 Subject to the implementation of avoidance and mitigation measures summarised above and detailed in Sections F7.46-47, a significant residual negative effect on the aquatic environment is extremely unlikely at the local level. The overall residual effect on Otters is therefore expected to be negligible at a local level.

Effect 4: Disturbance to habitat along the river corridors corridor due to construction and operational phase noise, lighting and human activity

During Construction and Operation

Effects

F7.205 In the absence of mitigation the habitat used by Otter along the River Ouzel corridor could potentially be subject to noise, light and human disturbance during the construction and operational phases. In the absence of mitigation this could reduce the suitability of the site for this species and depending on the severity of the effect, could result in a permanent but reversible adverse effect on Otter populations up to a district level, albeit lesser effects are much more likely.

Avoidance and Mitigation

F7.206 In addition to the measures set out in Sections F7.29-7.31 to avoid effects of noise and lighting on the watercourses during the construction and operational phases, the following measures should be implemented during the course of construction to preserve the integrity of the river corridors for Otter:

1 Where appropriate, temporary fencing should be installed along the River Ouzel and Broughton Brook throughout the construction phase to protect bankside habitats not affected by the Proposed Development from potential encroachment from heavy machinery, creation of stockpiles etc. The exclusion zone should be set a minimum of 8m from the top of the riverbank. Any incursions into the bankside exclusion zone should be carried out under the supervision of a suitably qualified ecologist following updated survey for Otters where appropriate.

2 During the construction phase, in order to prevent entrapment of Otters and other wildlife, any steep sided holes left open overnight should be equipped with a mammal ladder (a reinforced plywood board >60cm wide set at an angle of no greater than 30° to the base of the pit) and any temporarily open pipes with a diameter of >150mm should be plugged.

F7.207 Proposals for the linear park identified within the Illustrative Masterplan (Appendix C3, Volume 2 to this ES) include creation of a range of new wetland and new scrub and tree habitats. This provides opportunity for establishment of scrub pockets (where appropriate) alongside the watercourse in order to provide additional cover and sites suitable for holt building. Furthermore the SuDS strategy for the areas close to the rivers and wider site provides opportunities to create new areas of wetland habitat such as ditches and ponds, thereby providing new hunting opportunities for Otter.

F7.208 During the operational phase, negative effects on the integrity of the river corridors from increased recreational activity within the linear park will be avoided through strategic scrub planting and/ or permanent fencing along selected watercourse edges to deter public access at the most sensitive points. Footpaths within the linear park should also include formalised and way-signed footpaths that encourage people to stick to footpaths and avoid desire lines into more sensitive areas.

Residual Effects

F7.209 Subject to the measures outlined above to avoid disturbance to Otters and enhance retained habitats for this species, it is near certain that the Proposed Development will have an overall negligible effect on the local Otter population at a local level.

Key Ecological Receptor: Birds

F7.210 The breeding and wintering bird surveys showed the habitats of greatest interest within the site to include the arable land, woodland, hedgerows, mature trees, grassland, scrub and rivers. The assemblage of breeding birds recorded is likely to be broadly representative of the typical avifauna of similar habitats in the wider area which are relatively common and widespread in the surrounding landscape. Due to its relatively large size and the presence of breeding and wintering birds of conservation concern however the site is considered to be of low district value for birds.

Likely Significant Effects

F7.211 The potential effects of the Proposed Development on the ornithological interest of the site for consideration in this section are:

1 Effects on nesting birds during construction and operational phases, including direct physical damage and indirect effects of disturbance on new and retained habitats; and

2 Loss and fragmentation of habitats including trees, hedgerows, scrub and open farmland during the construction phase.

F7.212 Each of these potential effects of the Proposed Development is considered in turn below.

Effect 1: Effects on nesting birds through direct physical damage and indirect effects of disturbance on new and retained habitats.

During Construction

Effects

F7.213 Adverse effects of construction on breeding birds could potentially arise from a number of sources including:

1 Direct damage to active bird nests, their eggs or young as a result of clearance of vegetation or land;

2 Use of loud machinery in, or in proximity to, retained breeding habitats (e.g. trees, hedgerows or scrub);

3 Loud activities such as pile driving in, or in proximity to breeding habitat; and

4 Light spill from workers compounds, security lighting or floodlights used for night-time working.

F7.214 Assuming a worst case scenario in that the integrity of all habitats were affected simultaneously, this would result in an adverse significant effect at a district level albeit extremely unlikely, reversible and temporary during the construction phase.

Avoidance and Mitigation

F7.215 In order to avoid direct effects on nesting birds and contravention of nature conservation legislation, all building demolition, tree felling, ground clearance, and clearance of hedgerows and scrub should be carried out outside of the bird nesting season (generally taken as March to September inclusive). In the event that this is not possible, these works should be supervised by a suitably qualified ecologist who would check for nesting birds prior to and during works. In the event that nesting birds are found to be present, it may be necessary to delay further

F7.216 clearance works in the vicinity of the nest until nesting is completed and young birds have fledged. In addition, as Barn Owls can breed throughout the year it is recommended that any demolition of suitable buildings or felling of trees with suitable features between October and February are also preceded by a check by a suitably qualified ecologist to confirm absence of this species prior to works commencing. These measures should be incorporated within the CEMP to be secured by planning condition.

F7.217 In addition, in order to avoid temporary indirect effects of construction phase lighting and noise on areas of retained habitat used by breeding birds (even if they are to be lost following the bird breeding season), the following measures should be implemented:

1 Clearance or construction works within and immediately adjacent to retained areas of bird nesting habitat should employ the noise control measures identified in Section H5.0 of Chapter H (Noise), and avoid the nesting season as far as possible;

2 Night-time illumination of retained bird nesting habitats should be avoided throughout the construction phase, with site compounds and security lighting established a minimum distance of 15m from retained woodland, scrub, hedgerow and wetland habitats, using directional and hooded lighting as appropriate; and

3 The lighting scheme and working areas for the construction phase should be reviewed by a suitably qualified ecologist at an appropriate stage prior to works commencing.

Residual Effects

F7.218 Subject to implementation of the above measures, it is near-certain that no material effects on nesting birds would arise as a result of direct physical damage or disturbance from noise or lighting during the construction phase and therefore the overall residual effect is expected to be negligible at a local level.

During Operation

Effects

F7.219 Substantial negative effects of noise on birds are extremely unlikely to occur during the operational phase. Negative effects of lighting may arise however from the following sources:

1 At road or footpath crossing points or where these are located in close proximity to woodlands, scrub, wetland or hedgerow habitats; and

2 Light spill from development.

F7.220 Assuming a worst case scenario in that the integrity of all bird breeding habitat was affected simultaneously, this could result in a long-term negative effect at a district level, albeit extremely unlikely and reversible.

Avoidance and Mitigation

F7.221 In order to avoid the potential effects of operational phase lighting, lighting proposals should be of sensitive design to maintain suitability of retained and newly created adjacent areas of habitat for nesting birds. Measures by which this can be achieved are provided in Section F7.184above. New opportunities for nesting birds would also be provided within areas of the site away from the development areas. Suitable habitat creation opportunities are described in Section F9.3 below.

Residual Effects

F7.222 Subject to implementation of the above measures, it is expected that the development would be certain to have a negligible effect at a local level on nesting birds during the operational phase.

Effect 2: Loss and fragmentation of habitats including trees, hedgerows, scrub and open farmland

During Construction (continuing during Operation)

Effects

F7.223 A network of features suitable for birds would be retained within the Proposed Development as shown on the Green Infrastructure Parameter Plan and Illustrative Masterplan (Appendices C2 and C3, Volume 2 to this ES). This includes substantial green corridors within the linear park and M1 buffer, retention of a network of hedgerows and treelines around the site, creation of new woodland and orchard habitat at Moulsoe New Wood, and a number of new green corridors passing through and around development areas.

F7.224 Although loss of bird breeding habitat such as woodland, hedgerows, scattered trees and scrub has been kept to a minimum, the Proposed Development will result in the unavoidable loss of small areas of these habitats from the site. In addition, suitable areas of open habitat for common and widespread but declining farmland bird species such as Skylark, Linnet and Yellowhammer will be lost from the site. In the absence of mitigation this is likely to result in a negative effect on bird species present within the site at a moderate local level as a result of a reduction in the overall available breeding habitat.

Avoidance and Mitigation

F7.225 The development parameters provide substantial opportunities for habitat creation and enhancement within the linear park and M1 corridor. In keeping with those indicated on the Illustrative Masterplan (Appendix C3, Volume 2 to this ES), a range of new habitats should be established within these areas including woodland, scrub, scattered trees and hedgerows, high-value rough and meadow grassland, and new wetlands including open water and reedbeds. Opportunities for further habitat creation work across the site include new woodland and orchard in association with Moulsoe New Wood, new hedgerows, trees and pockets of woodland and scrub within and around the development areas, and a range of new wetland features in association with the SuDS network. Subject to appropriate design, this provision could be expected to maintain the populations of the majority of those bird species already present at the site, and provide new and enhanced opportunities for locally recorded birds of nature conservation interest, including substantial areas of high-quality habitat for Yellow Wagtail within the new wetland and meadow grassland areas.

F7.226 Although it would not be possible to maintain the current extent of habitat for ground nesting farmland bird species such as Skylark, similar habitat is abundant in the wider area and it is considered that the benefits of wider habitat creation and enhancement works that can be achieved by the development for other bird species and other wildlife could substantially outweigh the loss of habitat for this common and widespread (albeit declining) species.

F7.227 In addition to the habitat creation measures described above, additional measures to benefit birds through the Proposed Development should include the provision of a range of bird nesting boxes on buildings, bridges and trees, and use of fruit and nut producing tree and shrub species in landscape planting schemes. These additional measures are discussed further in Section F8.4 below.

Residual Effects

F7.228 Subject to the implementation of the measures outlined above, it is probable that habitat creation and enhancement associated with the Proposed Development will benefit both the majority of bird species already present at the site and additional species. Although temporary negative effects could be expected while new areas of habitat establish, depending on the extent of habitat creation works to be implemented across the site, the Proposed Development has potential to have an overall beneficial effect on birds at a local level in the long-term.

Key Ecological Receptor: Great Crested Newts

F7.229 As discussed in Section F4.94 and Appendices F16-17, and in advance of updated surveys where required (see below), for the proposes of this assessment populations of Great Crested Newts (GCN) are considered to be present within several ponds in the vicinity of Tongwell Street and the Pineham Nature Reserve in the south of the site. These include:

a A low-end moderate population of GCN within 9 ponds at Pineham Nature Reserve (Waterbodies 2, 3, 4, 5, 8, 9, 10, 11 and 13), confirmed by survey;

b A very low population of GCN within a pond (Waterbody 14A) approximately 65m from the south-western site boundary, confirmed by survey.

c High populations of GCN within seven ponds which have previously been recorded as supporting GCN by third party studies but not yet subject to updated survey or that have not previously subject to survey (Waterbodies 19A, 20, 21, 22, 23, 24, 25, 26 and 27).

F7.230 In view of the distribution of the ponds described above, it is likely that GCN use the southern and western areas of the site during terrestrial phases where suitable habitat occurs. Suitable habitats within these areas include hedgerows, scrub, scattered trees, rough grassland, tall ruderal vegetation and small areas of broadleaved woodland. Outside of these areas, the arable land, grazed semi-improved grassland fields, roads and managed grasslands within the site provide limited terrestrial opportunities and are unlikely to support significant numbers of GCN during terrestrial phases.

F7.231 Based on the size of the GCN population potentially present at the site and the availability of terrestrial habitat present, it is considered that the site has value for GCN at up to a low district level.

Likely Significant Effects

F7.232 The development parameters and emerging highway design indicate that one of the ponds identified as supporting GCN will be directly affected as a result of the proposals, namely Pond 19A below the Tongwell Street bridge. In addition, loss of terrestrial habitat from the development areas in the vicinity of the ponds has potential to adversely affect any GCN present.

F7.233 Potentially significant adverse effects on GCN arising from the Proposed Development are therefore:

1 Direct injury and mortality of individual GCN and reduction in available habitat during the construction phase; and

2 Increased likelihood of disturbance and accidental mortality through increased human activity during the operational phase.

F7.234 These are discussed below, together with details of appropriate avoidance, reduction, mitigation and enhancement measures, as applicable.

Effect 1: Direct injury and mortality of individual GCN and reduction in available habitat

During Construction and Operation

Effects

F7.235 In the absence of mitigation, in the event that loss of Pond 19A is unavoidable, this has the potential to directly affect the GCN population that it supports through direct injury and mortality of individuals during construction as well as causing a reduction in the overall availability of potential breeding habitat available for the local GCN population. The majority of breeding ponds within the site are however retained in the development Parameters within areas of informal greenspace, with habitat links maintained to retained habitats in the wider site.

F7.236 When considering effects on terrestrial habitat, English Nature research suggests that the maximum routine migratory distance of Great Crested Newts away from breeding ponds is 250m and that 95% of summer refuges are within 63m of breeding ponds [Ref 7]. A total of 420 ha of the site is located within 250m of the known and assumed breeding ponds described in Section F7.232 above and current proposals suggest that the majority of suitable terrestrial habitats within these areas will be retained. Nonetheless, small areas of woodland, scrub, hedgerows and rough grassland will be lost to the proposed Highways Infrastructure works and within development areas.

F7.237 In the absence of mitigation, the loss of the breeding pond and terrestrial habitat discussed above would be near certain to result in an adverse effect on GCN however given the retention of

the majority of breeding ponds and areas of green space secured within the development Parameters this effect is likely to be at no more than a local level.

F7.238 In addition, it will be necessary to avoid injury or killing of GCN to comply with nature conservation legislation and maintain the favourable conservation status of GCN within the site and wider area.

Avoidance and Mitigation

F7.239 A detailed description of measures to mitigate the effects of the Proposed Development on GCN is given in the GCN survey reports in Appendices F16-17. This gives consideration to protection of individual GCN through removal and exclusion from areas of the site affected by works where likely to support GCN prior to and during construction, and provision of replacement habitat within the landscape scheme of the Proposed Development to ensure that opportunities remain at the site for GCN in the long-term. Key elements are identified below together with further consideration of the effects of the Proposed Development on future opportunities at the site for GCN. It is recommended that the mitigation and avoidance measures outlined are subject to review following updating and extension of the GCN surveys to ponds within the vicinity of the proposed works which have not yet been subject to full survey or where survey data is becoming out of date prior to each phase of the development commencing.

F7.240 Further surveys should comprise a series of eDNA surveys of ponds not previously identified as supporting GCN and full population size class estimate surveys of all ponds either that have previously supported GCN or that test positive for GCN through eDNA survey. This work should ideally be carried out prior to determination of the application.

F7.241 Where substantial areas of suitable terrestrial habitat are affected, prior to commencement of development, a suitable receptor site should be identified and made suitable to accept more GCN through habitat enhancements if necessary. Exclusion fencing should then be erected around the boundary of the affected habitat and all GCN removed from the area through a process of trapping and translocation followed by vegetation manipulation/ destructive search works. Removal of GCN from the pond to be lost should be completed by pumping down of any water present and a destructive search at the end of the translocation period. Following translocation of all GCN out of the area, development works would then be able to proceed as normal subject to the exclusion fence being retained in situ and maintained for the whole construction period.

F7.242 Where only small and isolated areas of suitable terrestrial habitat are affected, a two-stage approach to vegetation clearance should be implemented, including a process of vegetation manipulation and destructive search under ecological supervision.

F7.243 All works affecting GCN ponds and terrestrial habitat will need to be carried out under a European Protected Species (EPS) licence, to be obtained from Natural England. Further details of mitigation for GCN at the site are provided in Appendices F16-17.

F7.244 In order to further protect GCN within the site during the operational phase, any gully pots to be installed within 250m of any GCN breeding ponds or areas of targeted GCN habitat creation works should be suitably designed with a stand-off from the kerb and/or through use of 'wildlife friendly' kerbs to avoid entrapment of GCN and other wildlife passing over hard landscaped areas. Consideration should also be given to installation of 'escape ladders' in drains. Where appropriate, dropped kerbs should also be used where GCN are likely to cross roads and other areas of hardstanding. Detailed drainage and infrastructure proposals for the development should be reviewed at appropriate design stages by a suitably qualified ecologist.

F7.245 To mitigate the loss of Pond 19A and limited areas of terrestrial habitat from the site, the detailed design for the development should include at least two new suitable breeding ponds along with retention and/ or creation of complementary terrestrial habitats, in accordance with the following design principles:

1 Areas of suitable terrestrial habitat should be accessible from newly created and retained GCN ponds. These could either be existing habitats already present in the vicinity of the site or retained/newly created habitats within the site itself. Suitable terrestrial habitats include woodland, scrub, rough grassland and hedgerows;

2 Opportunities for hibernation and refuge should be provided in the vicinity of the new ponds in the form of log/ brash piles and purpose-built hibernacula; and

3 Wherever possible, new and existing waterbodies within the site and wider area should be well connected by suitable terrestrial habitats.

F7.246 As discussed in section F9.3 below, the Illustrative Masterplan (Appendix C3, Volume 2 to this ES) shows how new wetland features could be delivered within the development, including as stand-alone features within the linear park and as part of the SuDS network. In order to maximise their ecological function, these features should include a variety of habitats including permanent and ephemeral standing water and aquatic/ marginal planting of value to GCN. A network of new high-quality terrestrial habitats such as scrub, rough grassland and woodland, could also be created within the areas of informal open space proposed at the site, with habitat connections maintained to new and existing ponds.

Residual Effects

F7.247 Through implementation of the above measures to protect individual GCN during construction and maintain breeding and terrestrial habitat within the site the proposed works would not be expected to have any adverse on the favourable conservation status of the GCN population present. It is therefore considered near certain that the residual effect on GCN during the construction and operational phases would be negligible at the site level. Subject to appropriate design, the habitat creation and enhancement proposals discussed above could be expected to provide substantial benefits to GCN in the long-term, through increasing the extent and quality of the breeding and terrestrial habitats present.

Effect 2: Increased likelihood of disturbance and accidental mortality through increased human activity

<u>During Operation Only</u>

Effects

F7.248 During the operational phase of the Proposed Development, effects on GCN may include disturbance by human activity through increased use of the site. Although any such adverse effects would be expected to be negligible at the site level in balance with the extensive habitat creation and enhancement works described above, measures are described below to reduce these effects on GCN at the site.

Avoidance and Mitigation

F7.249 To minimise the potential effects of increased human disturbance in the vicinity of GCN ponds, where access is permitted within areas of suitable habitat such as scrub, woodland edge and rough grassland within the Pineham Nature Reserve, linear park and other informal open spaces, clear paths should be provided to focus use along designated routes thereby limiting risk of disturbance. In addition, consideration should be given to provision of 'dog dips' at selected

locations in order to focus disturbance of wetland habitats in limited areas. No new access routes are proposed within the Pineham Nature Reserve.

Residual Effects

F7.250 Following implementation of the avoidance and mitigation measures described above to reduce any adverse effects on GCN arising from human disturbance, it is near certain that any residual adverse effect would be negligible at the site level in balance with habitat creation and enhancement works described above.

Key Ecological Receptor: Invertebrates

F7.251 The habitats of highest interest for invertebrates at the site include an area of woodland in the north of the site, mature trees within hedgerows throughout the site, and riparian bankside habitat along the River Ouzel. In combination, across the site these habitats are considered as a whole to support invertebrate assemblages of district and potentially county value. The vast majority of the site however, notably the arable fields and pastures, comprise habitat of low invertebrate interest.

Likely Significant Effects

F7.252 Although the majority of the habitats of highest interest for invertebrates will be retained within the development in accordance with the Green Infrastructure Parameters, some areas of habitat of value to invertebrates will be lost including some hedgerows and ditches, scattered trees including a small number of mature and potential veteran trees, and rough grassland field margins. These are discussed below.

Effect 1: Direct loss of some areas of habitat supporting invertebrates

During Construction Only

Effects

F7.253 The development proposals include the retention of the majority of mature and veteran trees at the site which will ensure that a high proportion of the standing deadwood resource is maintained. Where 11 potential veteran trees are lost as a result of the development, with the exception of one Oak tree these relate primarily to Ash trees, some of which may be expected to be lost within a relatively short timeframe due to their structural condition and the effects of Ash dieback which is prevalent within Milton Keynes, and the structural condition of the Apple tree which has a limited residual life expectancy.

F7.254 The loss of hedgerows and grassland field margins from development areas would also result in a direct loss of habitat as well as an overall reduction in the extent of supporting habitat around the retained potential veteran trees and mature trees.

F7.255 In the absence of mitigation, as well as direct loss of habitats of value to invertebrates there may also be further reduction in the overall deadwood resource within the site through management of retained mature and potential veteran trees for health and safety and good arboricultural practice during the construction and operational phases.

F7.256 Despite any such loss being likely to constitute only a small proportion of invertebrate habitat within the site and the surrounding area, in the absence of mitigation, a reduction in the overall habitat resource from the site would be expected to affect the overall integrity of the invertebrate assemblage present and this has potential to result in a significant permanent adverse effect on invertebrates at up to a county level although lesser effects are more likely in view of the small proportion of habitat likely to be affected in this way.

Avoidance and Mitigation

F7.257 The development proposals include the retention of the habitats of highest value to invertebrates including the rivers and riparian habitats, and the majority of woodland, hedgerows, ditches and potential veteran and mature trees, with habitat links maintained between these habitats around the site. Within the undeveloped areas of the site, the Green Infrastructure Parameters also provide substantial opportunities for the enhancement and creation of a range of habitats of value to invertebrates including woodland, scrub, hedgerows, wetlands and rough and meadow grassland as discussed in Section F9.3 below.

F7.258 Measures to ensure the protection of retained habitats of value to invertebrates are discussed above. In addition to the this, habitats of value to invertebrates should be further maintained through:

1 Retention of standing deadwood where safe to do so;

2 Veteranisation of selected trees where this is unlikely to affect property or public safety such as through the use of coronet cuts or bark-ringing. Ideal candidates for veteranisation include broadleaved species affected by 'haloing' around veteran trees;

3 Provision of log and brash piles using arisings from site clearance and ongoing habitat management works; and

4 Inclusion of nectar and pollen-rich species within landscape planting schemes.

F7.259 In addition to the habitat creation works described above, these measures would be expected to maintain the current level of invertebrate interest at the site and may provide enhanced habitat for some species where more extensive and higher quality tree planting, scrub, grassland and wetland habitats are provided.

Residual Effects

F7.260 Although there is expected to be a minor short-term negative effect on a local level on invertebrates at the site during the construction phase, when key habitat is lost and before new and enhanced habitat becomes established, in the long-term, following implementation of the avoidance and mitigation measures described above, significant negative effects are extremely unlikely and the residual effect is expected to be negligible at a local level. Depending on the extent of habitat creation works to be implemented across the site, the Proposed Development has potential to have an overall long-term beneficial effect on this receptor of district/ county value.

F8.0 Assessment of Effects, Mitigation Measures and Residual Effects: Other Ecological Receptors Requiring Mitigation

F8.1 A number of other important ecological receptors have been identified within the site which are of nature conservation value at up to a local level and/or are afforded protection under the provisions of the 2019 NPPF, the 1981 Wildlife and Countryside Act (as amended), the 2019 Conservation of Habitats and Species (Amendment) (EU Exit) Regulations or the 1992 Protection of Badgers Act. Whilst their value or conservation status, or the level of potential effects on these receptors, means they are not considered to be significant in the EIA decision-making process, they may require mitigation in order to avoid conflict with legislation and/or to accord with material nature conservation considerations under policy and guidance.

F8.2 In addition to the ecological receptors identified above, the other ecological receptors for consideration include:

1 Woodland;

2 Badgers; and

3 Reptiles.

F8.3 An assessment of potential effects of the Proposed Development on the ecological receptors identified above is provided below and in Appendices F4-18 together with details of mitigation measures to reduce these effects.

Other Ecological Receptor: Woodland

F8.4 Areas of woodland within the site include a parcel of semi-natural broadleaved woodland in the north-east of the site formerly designated as a BNS, belts of plantation woodland along Tongwell Street and within the Parks Trust land in the south of the site, and smaller pockets of semi-natural broadleaved and mixed plantation woodland in several places across the site, typically associated with hedgerows and field boundaries. Although relatively small and fragmented, the woodland areas within the site are in combination considered to be of high local nature conservation interest as they provide habitat for a range of wildlife in their own right, as well as forming part of the habitat network providing corridors for movement around the site.

Potential Effects

F8.5 Potential adverse effects of the Proposed Development on the woodland receptor include:

1 Loss of small areas of woodland;

2 Direct or indirect physical damage to retained trees;

3 Increased light and noise levels affecting value of retained and new woodland for wildlife; and

4 Damage to habitats resulting from an increase in recreational activity and tipping of garden waste.

F8.6 These are discussed below, together with details of appropriate avoidance, reduction, mitigation and enhancement measures, as applicable.

Effect 1: Loss of small areas of woodland

During Construction Only

Effects

F8.7 The Green Infrastructure Parameters secure the retention of the majority of the woodland within the site however small areas of woodland totalling 3.07ha are expected to be lost across the site as a whole, including areas in the footprint of the new M1 road crossing and within the proposed employment area, both of which currently comprise small blocks of plantation woodland, and smaller pockets of woodland elsewhere. The development Parameters do however secure areas of new woodland planting across the site. The effect arising from the loss of these small areas of woodland is subsequently considered to be not significant at a local level in view of the current low value of these habitats and the relative abundance of the habitat in the wider landscape. However, the measures described below are recommended to ensure that the current value of the woodland resource within the site is maintained and enhanced.

Avoidance and Mitigation

F8.8 In order to maintain and enhance the value of the woodland resource within the site, the development Parameters allow implementation of the following measures:

1 Loss of woodland habitats to development will be minimised wherever possible; and

2 Woodland lost to development will be replaced and the woodland resource of the site will be substantially expanded. New woodland planting opportunities provided by the Green Infrastructure Parameters and shown on the Illustrative Masterplan include in the region of 43.5ha of new woodland planting including a substantial area of new woodland and orchard planting in the east of the site within Moulsoe New Wood, where they will complement existing woodland habitats present.

F8.9 Notwithstanding this, where possible the following measures should be incorporated into the detailed design of the scheme in order to maintain the woodland resource for the lifetime of the development:

1 The substantial areas of open space proposed elsewhere within the site provide opportunities for new woodland planting as well as a mix of other complementary habitats such as scrub, hedgerows and rough grassland as discussed in Section F9.3 below and illustrated on the Illustrative Masterplan (Appendix C3, Volume 2 to this ES);

2 New and replacement woodland planting should be species-rich, using native species typical of the local area, and sourced from stock of local provenance where available;

3 Retained and newly created woodland habitats should be complemented by habitat linkages to hedgerows, scrub, treelines and other woodland areas to retain connectivity for wildlife around the site;

4 Where possible, residential dwellings should not back directly on retained and newly created woodlands in order to avoid garden creep and tipping of garden waste (see below);

5 'Ecotone' habitats should be established around the edges of new and retained woodland, comprising a gradation from woodland to scrub to rough grassland habitats. These are recognised for their ability to support a high diversity of species; and

6 Retained and newly created woodland habitats should be subject to management in order to ensure their value is maintained in the long-term.

Residual Effects

F8.10 Subject to implementation of the above measures, no long-term loss of connectivity or habitat resource provided by woodland at the site would be expected to occur during the construction or operational phases of the Proposed Development. No adverse effects on the nature conservation interest of the site's woodland resource are therefore expected to occur. The Proposed Development includes the planting of substantial new areas of woodland habitat within the site, most notably within Moulsoe New Wood. This alone would considerably increase the extent of woodland in a local context and, in time, would be expected to constitute a beneficial effect on the woodland resource of the site and the surrounding area.

Effect 2: Direct and indirect physical damage to retained trees

During Construction Only

Effects

F8.11 Site preparation and construction phase effects on retained trees may include direct damage, ground compaction, pollution, root severance and ground level changes. Damage to individual trees may negatively affect their longevity or their ability to support roosting bats, nesting birds and invertebrates and it is likely that in the absence of mitigation this effect could negatively affect a small number of individuals of these groups, as well as the overall integrity of the woodland habitats within the site. However, such incidents are likely to be localised and temporary, affecting only small parts of the woodland resource, and are likely to be reversible in the medium to long-term.

Avoidance and Mitigation

F8.12 Nonetheless, avoidance measures should be employed during the construction period to avoid the likelihood of damage to trees within woodland areas. Works in the vicinity of retained woodland habitats should be carried out in accordance with the current BS5837: Trees in Relation to Construction [Ref 3], unless otherwise carried out under an Arboricultural Method Statement approved by the Local Planning Authority

F8.13 Measures to avoid negative effects of dust on retained vegetation both within and adjacent to the site are described in Chapter G (Air Quality) of the ES. This includes details of a Dust Management Plan which will be included within a CEMP to be secured by planning condition. It is considered that through implementation of the CEMP, adverse effects of dust smothering and pollution on retained vegetation during the construction phase can be avoided.

Residual Effects

F8.14 With the above measures in place, it is near certain that the proposed construction activities would have a negligible effect on the integrity of the retained woodlands at a site level.

Effect 3: Increased light and noise levels affecting value of retained and new woodland for wildlife

During Construction and Operation

Effects

F8.15 Although unlikely to significantly impact on the integrity of the habitat itself, unsympathetic noise and lighting within or adjacent to woodland habitats during the construction and operational phases of the development would result in potential effects on breeding birds, invertebrates and nocturnal wildlife associated with this receptor. On a precautionary basis, it is assumed that in the absence of mitigation this effect could negatively affect the wildlife

associated with the woodland, since for example construction phase noise may lead to increased stress and abandonment of bird breeding territories, whilst excessive lighting may lead to a decrease in the available foraging habitat for light-intolerant bat species. However, given the species assemblages and small size of the foraging resource potentially affected in relation to the wider area, such an effect is unlikely to be significant at a local level.

Avoidance and Mitigation

F8.16 Notwithstanding the above, in order to avoid and reduce these effects, night-time illumination of woodland habitats should be avoided throughout the site preparation and construction phases, with site compounds and security lighting established at an agreed location away from woodland edges. Detailed lighting proposals for the site should also be reviewed by a suitably qualified ecologist at an appropriate stage.

F8.17 In addition, it is recommended that a buffer zone is provided between new and retained woodlands and areas of new residential and commercial development. The buffer zones should be located outside of private curtilages and maintained free from development (although localised works and suitably designed SuDS and footpaths could be included where this does not substantially affect the rooting zones of woodland trees). Buffers should largely comprise semi-natural habitats such as native scrub and tree planting and rough and meadow grassland. The size of the buffer will depend on the woodland in question and the nature of the adjacent development, however a minimum buffer size of 5m will be applicable in most instances. Woodland areas of higher ecological interest may require a larger buffer, and the development Parameters allow provision of a minimum 15m buffer from the canopy edge around the woodland formerly designated as the Wood South of Wepener BNS in the east of the site.

Residual Effects

F8.18 Through implementation of the above measures it is near certain that effects of construction and operational phase noise and lighting on the integrity of woodland habitats would be negligible at a local level.

Effect 4: Damage to habitats resulting from an increase in recreational activity and tipping of garden waste

<u>During Operation Only</u>

Effects

F8.19 Potential effects of the development on the site's woodland habitats could arise as a result of an increase in recreation and tipping of garden waste during the operational phase causing damage to woodland habitats through disturbance, damage to habitats and introduction of invasive species. In the absence of mitigation, this effect could negatively affect the overall integrity of the woodland habitats within the site.

Avoidance and Mitigation

F8.20 In order to avoid effects of recreational pressure and tipping of garden waste and preserve the integrity of both retained and newly created woodland habitats at the site, the following measures should be implemented:

1 Provision of buffer zones between development and woodland areas as described in Section F8.17 above;

2 Design of development areas to avoid residential curtilages directly backing on to woodland and woodland buffer zones;

3 Provision of compost bins within gardens/ allotments in close proximity to woodland;

4 Provision of clearly marked paths and interpretive signage through least sensitive areas of woodland habitat; and

5 Management of woodland to include removal of debris and tipped items, control of invasive species, maintenance of deadwood habitats where safe to do so and provision of new opportunities for wildlife within woodlands and adjacent habitat such as provision of bird and bat boxes and habitat piles and creation of complementary habitats within woodland buffer zones.

Residual Effects

F8.21 Through implementation of the above measures, it is considered near certain that effects on the integrity of the woodland resource due to human disturbance and tipping of garden waste would be negligible at a local level.

Other Ecological Receptor: Badgers

F8.22 Seventeen outlying Badger setts have been recorded across the site, including three setts considered to be in 'current use' [Ref 19]. The grassland, field margins, hedgerow, scrub and woodland habitats throughout the site are of potential value to foraging Badgers however the arable land dominating the majority of the site is considered to have low value.

Potential Effects

F8.23 The potential effects of the Proposed Development on the Badgers using the site for consideration in this section are:

1 Loss of Badger setts and injury/ mortality of occupying Badgers.

2 Loss of foraging habitat, isolation of retained setts from foraging habitat and increased mortality of Badgers through road traffic accidents.

3 Construction and operational phase disturbance from human activities, noise and lighting.

Effect 1: Loss of Badger setts and injury/ mortality of occupying Badgers

Effects

F8.24 The development Parameters indicate that although six of the identified Badger setts can be retained within the scheme with a suitable buffer maintained between the setts and areas of development, it may not be possible to retain the active outlying Setts F and L or the disused outlying Setts C1, D, E, H, I, J, K, L and N as these either fall within areas affected by the Highways Infrastructure works or within development parcels identified within the development parameters. Outlying setts are non-breeding setts and generally used on an occasional/ temporary basis, with new outlying setts created and old ones abandoned on a relatively frequent basis. In view of this, loss of these setts is considered extremely unlikely to result in an overall negative effect on the Badger population at a local level.

Avoidance and Mitigation

F8.25 Although the loss of a small number of outlying setts to the Proposed Development is not expected to result in significant overall effects on Badgers as a receptor, where the Proposed Development has potential to affect individual Badgers, avoidance and mitigation measures will be required in accordance with nature conservation legislation and planning policy and guidance. These are summarised below:

1 Badgers are very mobile animals and occasionally setts may be abandoned and old setts reclaimed. All setts within the site should therefore be resurveyed in advance of each development phase to confirm their status prior to development commencing.

2 If the updated survey shows any of the setts present to be in current use prior to development, it will be necessary to apply for a Natural England licence to close the affected setts prior to development. The recommended method for sett closure involves the entrances being "soft stopped" initially to confirm current use, followed by the installation of one-way gates at the sett entrances. Sett closures can only be carried out outside of the Badger breeding season between July and November inclusive. All procedures relating to the closure of a sett would need to be subject to a detailed method statement and monitored by the licensee and/or accredited agents.

Residual Effects

F8.26 Subject to the measures outlined above to avoid damage to setts and disturbance of occupying Badgers, it is expected that the Proposed Development will have a negligible effect as a result of loss of Badger setts or mortality of occupying Badgers at a local level.

Effect 2: Loss of foraging habitat, isolation of retained setts from foraging habitat and increased mortality of Badgers through road traffic accidents

During Construction and Operation

Effects, Avoidance and Mitigation

F8.27 Although the majority of the site provides areas of moderate quality foraging habitat for Badgers, habitats of similar and higher quality than those within the site are abundant in the wider area and only low levels of Badger activity were recorded from the site during the surveys.

F8.28 In view of the extent and nature of open space to be provided within the informal open spaces of the development as shown on the Green Infrastructure Parameters, it is highly unlikely that the development would result in a substantial overall loss of Badger foraging habitat from the site in the context of its current use. Where possible areas of informal open space should include areas of high quality Badger foraging habitat such as woodland, scrub, orchard and rough and meadow grassland habitats, as shown on the Illustrative Masterplan (Appendix C3, Volume 2 of this ES). Planting proposals beyond the proposed orchard area should also include fruit and nut producing species where appropriate.

F8.29 Furthermore, the emerging proposals maintain connectivity between retained Badger setts and areas of foraging habitat. This includes suitable design of bridges over the River Ouzel and M1 that enable passage of Badgers and other wildlife without entering the carriageway through provision of underpasses, tunnels and/ or ledges (Appendix C1, Volume 2 of this ES).

Residual Effects

F8.30 Connectivity between retained Badger setts and suitable areas of foraging habitat both within the site and the wider area is expected to be maintained by the development parameters and the emerging landscape design. Therefore any impact on foraging Badgers is expected to be negligible at the site level.

Effect 3: Disturbance of Badgers occupying retained setts and Badgers using areas of foraging and commuting habitat

During Construction and Operation

Effects, Avoidance and Mitigation

F8.31 In order to avoid disturbance of Badgers occupying active setts during the construction and operational phases of the development, the following principles should be implemented:

1 New footpath routes should maintain a minimum stand-off of 10m from retained Badger setts unless otherwise advised by a suitably qualified ecologist;

2 Where appropriate, consideration should be given to use of fencing and dense scrub planting around Badger setts to restrict public access to the setts and potential for disturbance of Badgers; and

3 A suitably qualified ecologist should be consulted at the design and implementation stages of any minor works proposed within 20m of a sett, such as installation of fencing, clearance or new tree or shrub planting, in order to confirm whether disturbance of Badgers is likely and provide advice on any necessary measures to prevent disturbance arising.

F8.32 Badgers are very mobile animals and occasionally setts may be abandoned and old setts reclaimed. The Badger survey should therefore be updated at appropriate design stages and prior to site clearance/ construction of each phase commencing in order to confirm that no new setts have been dug within areas affected by the proposed works. Advice on the need for, and timing of, update surveys should be sought from a suitably qualified ecologist in accordance with the emerging project timeframe.

F8.33 As discussed in Section F8.28 above, effects on foraging Badgers are not expected to arise during the construction or operational phases of the development in view of the low level of current use of the site by Badgers, the extent of habitat retention within the development Parameters and enhancement opportunities as indicated on the Illustrative Masterplan (Appendix C3, Volume 2 of this ES). Notwithstanding this, the following measures should be adopted:

1 The lighting design for the construction and operational phases of the development should be of sensitive design to maintain suitability of retained and newly created habitats for nocturnal wildlife. Measures by which this can be achieved are provided in Section F7.1874above;

2 Connections should be maintained between the retained setts and areas of new and retained foraging habitat within the site and the wider countryside as far as practicable, including strategically located measures to allow passage beneath internal roads (see Section F8.29 above);

3 During the construction phase, any steep sided holes left open overnight should be equipped with a mammal ladder (a reinforced plywood board >60cm wide set at an angle of no greater than 30^{o} to the base of the pit) to prevent entrapment and any open pipes with a diameter of >150mm plugged.

Residual Effects

F8.34 Providing the mitigation measures outlined above are implemented, it is considered near certain that the development would avoid significant disturbance of any Badgers occupying setts or using areas of foraging habitat, and no adverse effect on the local Badger population are expected to arise during the construction or operational phases. Any such effect is therefore expected to be negligible at the site level.

Other Ecological Receptor: Reptiles

F8.35 The site supports very low populations of Grass Snake and Slow-worm, with individuals of these species recorded from rough grassland, scrub and hedgerow base habitats across the site. Although suitable habitat for reptiles is found throughout the site, the majority of the site comprises arable land, grazing pasture and developed land which comprises highly unsuitable habitat for reptiles. The site is therefore assessed to be at most of low local value for reptiles.

Potential Effects

F8.36 In the absence of mitigation and avoidance measures the potential effects of the Proposed Development on the reptile interest of the site include:

1 Direct injury or mortality of reptiles during the construction phase;

2 Reduction in the availability of suitable habitat from the site; and

3 Disturbance and mortality of reptiles through increased predation and human activity during the operational phase.

F8.37 These potential effects are considered below, together with details of appropriate avoidance, reduction, mitigation and enhancement measures, as applicable.

Effect 1: Direct injury or mortality of individual reptiles

During Construction Only

Effects

F8.38 Only very low numbers of Grass Snake and Slow-worm are considered to be present within the limited areas of suitable habitat within the site, and development works are unlikely to affect the nature conservation status of the local reptile population due to the continued presence retained areas of suitable habitat within the site and maintenance of connectivity with off-site habitats. Notwithstanding this, the basic level of protection afforded to all reptile species would apply (i.e. protection against killing and injuring) and the clearance works should be carried out using the precautionary measures described below.

Avoidance and Mitigation

F8.39 Where habitats with the potential to support reptiles are lost to development, in order to ensure that the development employs reasonable effort to safeguard any reptiles present, a precautionary approach to vegetation clearance is recommended to displace any reptiles present into areas of retained or newly created habitats. This would involve habitat manipulation to displace reptiles from areas of works into contiguous retained areas of suitable habitat under the supervision of a suitably qualified ecologist in accordance with the methodologies described in the reptile survey reports provided in Appendices F14-15 or through capture in combination with GCN mitigation works where affected areas of habitat potentially affecting both groups coincides.

Residual Effects

F8.40 Providing the mitigation measures outlined above are implemented, it is considered near certain that the development would avoid injury or killing of any reptiles present, and no adverse effects on the local reptile population are expected to arise during the construction phase. Any such effect is therefore expected to be negligible at the site level.

Effect 2: Reduction in the availability of suitable habitat from the site

Construction (continuing during Operation)

Effects

F8.41 The Proposed Development will result in the loss of limited areas of reptile habitat where new buildings and hardstanding take the place of field margins, scrub, hedgerow bases, wetland and woodland edge habitats. In the absence of mitigation this is likely to result in an adverse effect on reptiles from a reduction in the overall available habitat, however due to only very limited areas of suitable reptile habitat being affected, the very low numbers of reptiles present, and the retention of habitat within the substantial areas of open space any such adverse effect is expected to be negligible at a local level. This loss would occur during the construction phase.

Avoidance and Mitigation

F8.42 The Proposed Development provides opportunities for extensive enhancement and creation of suitable habitat for reptiles within the linear park, Moulsoe New Wood and other areas of informal open space, including species-rich meadow and rough grassland, scrub, traditional orchard and woodland habitats and creation of new waterbodies described further in Section F9.3. As they mature, it is expected that the larger gardens and informal open spaces within the development areas may also provide some opportunities for reptiles where landscape proposals include tree, shrub and scrub planting and establishment of new areas of rough and meadow grassland.

F8.43 In addition to securing the enhancement and creation of new reptile habitat at the site, additional measures to benefit reptiles in the long-term should include the enhancement of opportunities for hibernation and refuge though provision of log/brash piles and purpose-built hibernaculum. These additional measures are discussed in Section F9.4 below.

Residual Effects

F8.44 Subject to the implementation of the measures outlined above, it is expected that habitat creation and enhancement works associated with the Proposed Development could benefit reptile populations associated with the site and its surrounds. Although short to medium term adverse effects may arise while new areas of habitat establish these are considered to be negligible at the local level and, subject to the implementation of the habitat creation and enhancement works summarised above, it is extremely likely that the Proposed Development would have a long-term beneficial effect for reptiles.

Effect 3: Disturbance and mortality of reptiles through increased predation and human activity

During Operation Only

Effects

F8.45 During the operational phase of the Proposed Development, effects on reptiles may include increased predation by cats and disturbance by human activity through increased use of the site. Although any such adverse effects would be expected to be negligible at the site level in balance with habitat creation and enhancement works described above, measures are described below to reduce these effects on reptiles at the site.

Avoidance and Mitigation

F8.46 To minimise the potential effects of increased human disturbance within areas of reptile habitat such as scrub, woodland edge and meadow and rough grassland within the linear park and other

informal open spaces, clear paths should be provided to focus use along designated routes thereby limiting the extent of disturbance to selected areas.

F8.47 To reduce effects on reptiles from increased cat predation it is recommended that new residents are provided with a 'Living with Wildlife' leaflet to raise awareness about the habitats within and adjacent to the site and the presence of local wildlife, including reptiles. This should include advice to keep cats in at night and ensuring cats wear collars with bells to avoid them killing reptiles and other groups such as small mammals. In addition, where reptile refugia and hibernacula are installed as part of the enhancements recommended in Section F9.4, these should be sited away from the developed areas and new reptile habitat provision should be maximised within the landscape design in order to off-set any effects that predation or disturbance might have on reptile numbers.

Residual Effects

F8.48 Following implementation of the avoidance and mitigation measures described above to reduce any adverse effects on reptiles arising from human disturbance and cat predation, it is near certain that any residual adverse effect would be negligible at the site level in balance with habitat creation and enhancement works described above.

F9.0 Habitat Enhancement, Management and Monitoring

Habitat Enhancement

F9.1 The NPPF (Section F2.4) includes the broad aim that planning, construction, development and regeneration should have minimal effects on biodiversity and enhance it wherever possible. In moving towards this vision, the Government constructed a set of objectives which include:

"...promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity" and "...opportunities to incorporate biodiversity improvements in and around developments should be encouraged, especially where this can secure measurable net gains for biodiversity."

F9.2 This is supported by the 2006 NERC Act which requires decision makers, such as planning authorities, to have regard to the conservation of biodiversity in England.

F9.3 The layout of the Proposed Development as set out in the Green Infrastructure Parameter Plan has been arrived at through an iterative design process which has integrated ecological considerations into successive design amendments. Specific measures integrated into the design of the Proposed Development and opportunities reflected in the Illustrative Masterplan (Appendix C3, Volume 2 to this ES) in keeping with the objectives of NPPF, are illustrated on Figure F9 (Volume 2 to this ES). These are summarised below together with measures to maximise their value to wildlife.

F9.4 Key semi-natural habitat creation and enhancement opportunities within the Development Site, which could be provided beyond that required for mitigation described above, include:

1 Creation of high-quality wetland habitats in association with the SuDS, or as stand-alone features within the linear park and other areas of open space to include a selection of wetland habitats such as open water, reedbeds, swales, ditches, wet grassland and permanent and ephemeral ponds to be planted with a variety of aquatic and marginal plant species;

2 Enhancement of River Ouzel and Broughton Brook through reprofiling of the riverbanks to create more naturalised margins supporting a mix of marginal and aquatic plant species and creation of new floodplain pools/ backwaters;

3 Establishment of species-rich meadow and rough grassland within the linear park and other areas of informal open space and management through a suitable cutting regime;

4 Establishment of new areas of woodland, orchard, trees and scrub in Moulsoe New Wood and other areas of informal open space and in association with the road network using native species appropriate to the local area, sourced from stock of local provenance wherever possible;

5 Creation of ecotones along woodland edges, comprising a gradation from woodland to scrub to rough and meadow grassland habitats, noted for their high biodiversity value;

6 Infilling of gaps in retained hedgerows and establishment of new species-rich hedgerows across and around the Development Site in association with development area boundaries and areas of open space;

7 Use of management techniques such as veteranisation of selected retained mature trees to promote deadwood of value to invertebrates; and,

8 Establishment of new standard trees in areas of formal and informal open space and development areas.

F9.5 Other opportunities for wildlife within the overall green infrastructure of the Development Site should be provided within the proposed landscape and structural planting, and formal and informal open spaces. The detailed design should have regard to the following principles to in order to maximise value for wildlife where these land uses occur:

1 Inclusion of species with the following characteristics in formal tree and shrub planting:

   i Fruit and nut bearing species;

   ii Native species appropriate to the local area, where possible sourced from stock of local provenance; and,

   iii Nectar and pollen-rich species such as those listed on the Royal Horticultural Society's Perfect for Pollinators website [Ref 23].

2 Use of diverse herb-rich seed mixes where appropriate for amenity grassland creation;

3 Installation of a range of bat and bird boxes on trees and built structures;

4 Retention of deadwood habitats where safe to do so;

5 Provision of log and brash piles;

6 Provision of artificial Otter holt within an undisturbed section of river bank;

7 Use of native hedgerow planting along the boundaries of new properties; and,

8 Ensure presence of gaps in boundary fencing and use of dropped kerbs and off-set gully pots in appropriate locations to allow movement of wildlife such as Hedgehogs and amphibians.

F9.6 The enhancement measures identified above would be delivered during construction of each relevant development phase. Upon completion of the above identified works, these enhancement measures would be subject to management and monitoring as discussed below.

Habitat Management

F9.7 It is recommended that a Landscape and Ecological Management Plan (LEMP) is prepared at an appropriate stage to identify how habitats of nature conservation interest within the Development Site will be managed to ensure the long-term nature conservation interest of retained, enhanced and newly created habitats during establishment and the operational phase of the Proposed Development. The preparation and implementation of this detailed Management Plan could be subject of a condition of planning consent.

Monitoring

F9.8 In order to assess the effectiveness of the mitigation described within this Chapter during the operational phase of the Proposed Development, and to ensure the successful establishment of ecological enhancements across the Development Site, it is recommended that a monitoring programme be implemented as part of the ongoing management to assess the condition of retained, enhanced and newly created habitats, and target species of nature conservation interest including bats, birds and invertebrates.

F9.9 In addition, prior to each phase of the site preparation and construction works the advice of a suitably qualified ecologist should be sought with regard to any requirement to update ecological survey work in order to ensure that mitigation proposals reflect the current status of species occurring at the Development Site at the time of the development works.

F10.0 Summary & Conclusions

F10.1 The design and layout of the Proposed Development has been arrived at through an iterative process, with the findings of ecological surveys providing informed advice on avoidance and reduction of ecological effects and inclusion of opportunities for ecological enhancement over successive design iterations. Through this approach, avoidance of or mitigation for key ecological effects have been successfully integrated into the design of the Proposed Development. Where additional measures have been required to safeguard the ecological value of the Development Site, these have been identified in Sections F7 and F8 above. This has resulted in negligible residual ecological impacts on the majority of receptors both in isolation and in combination with other developments in the wider area, with the exception of common and widespread farmland species associated with open habitats such as Skylark.

F10.2 In addition to addressing the specific effect avoidance, mitigation and enhancement measures for each of the identified important ecological receptors associated with the Development Site, the Proposed Development in accordance with the measures described could create new opportunities for wildlife through habitat creation, management and enhancement, providing beneficial effects for protected, notable and common habitats and species in accordance with the provisions of the NPPF and the 2006 NERC Act.

F10.3 Table F10.1 below contains a summary of the likely effects of the Proposed Development on Ecology. Within the table ' Significance and nature of effect' identifies the scale of the impact (negligible, minor, moderate, major) on the identified level of interest of the feature concerned (Site, Local, District, County, Regional, National, International) in keeping with the approach outlined from Section F3.20 and Table F3.1 above. Negligible effects are not significant in EIA terms.

Table F10.1 Summary of Effects on Ecological Receptors

Receptor	Sensitivity (Site, Local, Regional, District, County, National, International)	Summary description of the identified effect	Effect magnitude before mitigation (*in extremis*)	Significance and nature of effect before mitigation (*in extremis*)	Residual effect magnitude after mitigation	Residual significance and nature of effect after mitigation
Key Ecological Receptor: River Ouzel and Broughton Brook MKWCs (including Pineham Nature Reserve)	District	**DURING CONSTRUCTION** - Waterborne pollution entering watercourses and other wetland habitats through site run-off or accidental spillage. - Adverse effects on the quantity/ continuity of flow of the watercourses. - Increased noise and lighting disturbance to wildlife currently using the river corridors. - Loss of connectivity where the River Ouzel is crossed by new road and foot/ cycle bridges. - Direct or indirect physical damage to retained trees and vegetation along the river corridors. - Establishment of substantial corridor of complementary semi-natural habitats within the linear park (beneficial). **DURING OPERATION** - Waterborne pollution entering watercourses through site run-off or accidental spillage. - Adverse effects on the quantity/ continuity of flow of the watercourses. - Increased noise and lighting disturbance to wildlife currently using the river corridors. - Increased recreational pressure on river corridors.	Large	Major adverse	Negligible	Negligible (opportunity for beneficial)
Key Ecological Receptor: M1 MKWC	District	**DURING CONSTRUCTION** - Loss of scrub and trees of limited ecological importance in their own right and severance of existing wildlife corridor where crossed by new road.	Medium	Major adverse	Negligible	Negligible (opportunity for beneficial)

Receptor	Sensitivity (Site, Local, Regional, District, County, National, International)	Summary description of the identified effect	Effect magnitude before mitigation (*in extremis*)	Significance and nature of effect before mitigation (*in extremis*)	Residual effect magnitude after mitigation	Residual significance and nature of effect after mitigation
		- Direct physical damage to retained trees, scrub, hedgerows and other retained vegetation and indirect damage through ground compaction, pollution, root severance, ground-level changes and loss of supportive habitat. - Increased light levels affecting value of retained and newly created habitat for wildlife. - Opportunity for establishment of new adjacent complementary scrub, woodland and scattered tree habitats as part of the Development Site's green infrastructure (beneficial). **DURING OPERATION** - Operational-phase direct and indirect physical damage to new and retained scrub and trees. - Increased light levels affecting value of retained and new habitats for wildlife.				
Key Ecological Receptor: Other non-statutory designated sites and ancient woodlands within the ZoI	County-District	**DURING CONSTRUCTION** - Nitrogen deposition arising from an increase in traffic on local roads affecting habitats within the designated sites. **DURING OPERATION** - Nitrogen deposition arising from an increase in traffic on local roads affecting habitats within the designated sites. - Effects of an increase in recreational pressure on habitats and species for which the Development Sites are designated.	Large	Major adverse	Negligible	Negligible
Key Ecological Receptor: Network of hedgerows,	District	**DURING CONSTRUCTION** - Loss of hedgerows and trees of limited ecological importance in their own right.	Large	Major adverse	Negligible	Negligible

Receptor	Sensitivity (Site, Local, Regional, District, County, National, International)	Summary description of the identified effect	Effect magnitude before mitigation (*in extremis*)	Significance and nature of effect before mitigation (*in extremis*)	Residual effect magnitude after mitigation	Residual significance and nature of effect after mitigation
ditches, scrub, treelines and scattered trees in combination		- Severance of existing hedgerow corridors where crossed by roads/ cycleways/ footpath routes. - Direct physical damage to retained hedgerows, trees and scrub and indirect damage through ground compaction, pollution, root severance, ground-level changes and loss of supportive habitat for associated wildlife. - Increased light and noise levels affecting the value of retained hedgerows, ditches, scrub and trees for wildlife. - Establishment of new structural landscape planting and opportunity for other new hedgerow, scattered trees and ditch habitats as part of the Development Site's green infrastructure and SuDS network (beneficial). **DURING OPERATION** - Direct and indirect physical damage to hedgerows, scrub and trees. - Increased light and noise levels affecting the value of retained hedgerows, ditches, scrub and trees for wildlife.				
Key Ecological Receptor: Potential veteran trees (in combination)	District (low)	**DURING CONSTRUCTION** - Direct loss of potential veteran trees and deterioration of retained trees through loss of associated habitat. - Direct or indirect physical damage to retained potential veteran trees through ground compaction, pollution, root severance and ground-level changes. - Increased light and noise levels affecting value of retained potential veteran trees for wildlife.	Large	Major adverse	Negligible	Negligible

Receptor	Sensitivity (Site, Local, Regional, District, County, National, International)	Summary description of the identified effect	Effect magnitude before mitigation (*in extremis*)	Significance and nature of effect before mitigation (*in extremis*)	Residual effect magnitude after mitigation	Residual significance and nature of effect after mitigation
		DURING OPERATION - Deterioration of retained trees through loss and damage to associated habitat. - Increased light and noise levels affecting value of retained potential veteran trees for wildlife.				
Key Ecological Receptor: Stream in east of site and network of ponds (outside of Pineham Nature Reserve)	District	**DURING CONSTRUCTION** - Direct loss of pond habitats and loss of connectivity where the stream is crossed by roads. - Adverse effects on the quality and quantity of water entering the waterbodies and continuity of the flow of the eastern stream - Increased noise and light disturbance to wildlife currently using the waterbodies. - Creation of new complementary wetland habitats as part of the SuDS proposals and as stand-alone features (beneficial). **DURING OPERATION** - Adverse effects on the quality and quantity of water entering the waterbodies and continuity of the flow of the eastern stream. - Increased noise and light disturbance to wildlife currently using the waterbodies.	Large	Major adverse	Negligible	Negligible (opportunity for beneficial)
Key Ecological Receptor: Bats	Local (high) - District (low)	**DURING CONSTRUCTION** - Injury/ mortality of roosting bats, destruction or abandonment of roosts and loss of bat roosting opportunities. - Mortality of foraging/ commuting bats and effects on foraging and commuting habitat through habitat loss and fragmentation and increased light levels.	Large	Major adverse	Negligible	Negligible (opportunity for beneficial)

Receptor	Sensitivity (Site, Local, Regional, District, County, National, International)	Summary description of the identified effect	Effect magnitude before mitigation (*in extremis*)	Significance and nature of effect before mitigation (*in extremis*)	Residual effect magnitude after mitigation	Residual significance and nature of effect after mitigation
		- Opportunities for enhanced foraging habitat within site's green infrastructure through establishment of new wetlands and meadow grassland, trees and scrub (beneficial). **DURING OPERATION** - Injury/ mortality of roosting bats, destruction or abandonment of roosts and loss of bat roosting opportunities. - As the buildings/ trees of the Proposed Development age/ mature it is likely that these will provide new opportunities for roosting bats (beneficial). - Mortality of foraging/ commuting bats and effects on foraging and commuting habitat through habitat loss and fragmentation and increased light levels.				
Key Ecological Receptor: Otter	District	**DURING CONSTRUCTION** - Risk of injury to/mortality of individual Otters during construction of new road and foot/cycleway crossings. - Fragmentation of River Ouzel corridor and increase in road traffic accidents through new road crossings. - Degradation of habitat through waterborne pollution entering the River Ouzel/ Broughton Brook watercourses or alterations to the quantity/ continuity of flow. - Disturbance to habitat along river corridor due to noise, lighting and human activity. - Opportunity to enhance foraging habitat through enhancement of riparian habitats within the linear park (beneficial). - Opportunity to enhance the extent of potential holt sites through new scrub and tree planting within the linear park and provision of artificial holt (beneficial).	Medium	Major to Moderate adverse	Negligible	Negligible

Receptor	Sensitivity (Site, Local, Regional, District, County, National, International)	Summary description of the identified effect	Effect magnitude before mitigation (*in extremis*)	Significance and nature of effect before mitigation (*in extremis*)	Residual effect magnitude after mitigation	Residual significance and nature of effect after mitigation
		DURING OPERATION - Increase in road traffic accidents through new road crossings. - Degradation of habitat through waterborne pollution entering the River Ouzel/ Broughton Brook watercourses or alterations to the quantity/ continuity of flow. - Disturbance to habitat along river corridor due to noise, lighting and human activity.				
Key Ecological Receptor: Birds	District (low)	**DURING CONSTRUCTION** - Effects on nesting birds through direct physical damage and indirect effects of disturbance on new and retained habitats. - Loss and fragmentation of habitats including trees, hedgerows, scrub and open farmland. - Opportunities for establishment of new breeding and foraging habitat and ecological corridors as part of site's green infrastructure (positive). **DURING OPERATION** - Effects on nesting birds through direct physical damage and indirect effects of disturbance on new and retained habitats.	Large	Major adverse	Small	Minor adverse (open farmland species) (opportunity for beneficial)
Key Ecological Receptor: Great Crested Newts	District (low)	**DURING CONSTRUCTION** - Direct injury and mortality of individual GCN and reduction in available habitat. - Establishment of new potential breeding habitat and new terrestrial habitat (beneficial).	Small	Major to moderate adverse	Negligible	Negligible (opportunity for beneficial)

Receptor	Sensitivity (Site, Local, Regional, District, County, National, International)	Summary description of the identified effect	Effect magnitude before mitigation (*in extremis*)	Significance and nature of effect before mitigation (*in extremis*)	Residual effect magnitude after mitigation	Residual significance and nature of effect after mitigation
		DURING OPERATION - Increased likelihood of disturbance and accidental mortality through increased human activity.				
Key Ecological Receptor: Invertebrates	District-County	**DURING CONSTRUCTION** - Direct loss of some areas of habitat supporting invertebrates. - Opportunities for creation of new areas of high-quality habitat in the linear park and other open spaces as part of site's green infrastructure (beneficial). **DURING OPERATION** - Establishment of new habitat in gardens and formal open spaces in areas formerly of low invertebrate interest such as arable land (beneficial).	Small	Major to moderate adverse	Negligible	Negligible (opportunity for beneficial)
Other Ecological Receptor: Woodland parcels (in combination)	Local (high)	**DURING CONSTRUCTION** - Loss of small areas of woodland. - Direct or indirect physical damage to retained woodland trees. - Increased light and noise levels affecting value of retained woodland for wildlife. - New woodland and orchard planting secured by parameters and opportunity for further establishment of new woodland planting and complementary habitats within open spaces (beneficial). **DURING OPERATION** - Increased light and noise levels affecting value of retained and new woodland areas for wildlife. - Damage to habitats resulting from an increase in recreational activity and tipping of garden waste.	Medium	Minor adverse	Negligible	Beneficial (local level)

Receptor	Sensitivity (Site, Local, Regional, District, County, National, International)	Summary description of the identified effect	Effect magnitude before mitigation (*in extremis*)	Significance and nature of effect before mitigation (*in extremis*)	Residual effect magnitude after mitigation	Residual significance and nature of effect after mitigation
Other Ecological Receptor: Badger	Local (low)	**DURING CONSTRUCTION** - Loss of Badger setts and injury/ mortality of occupying Badgers. - Loss of foraging habitat, isolation of retained setts from foraging habitat and increased mortality of Badgers through road traffic accidents. - Disturbance from human activities, noise and lighting. **DURING OPERATION** - Increased mortality of Badgers through road traffic accidents - Disturbance from human activities, noise and lighting.	Large	Moderate adverse	Negligible	Negligible
Other Ecological Receptor: Reptiles	Local (low)	**DURING CONSTRUCTION** - Direct injury/ mortality of reptiles. - Reduction in the availability of suitable habitat from the Development Site. - Opportunity for creation and maintenance of areas of new habitat within the linear park and as part of the Development Site's wider green infrastructure (beneficial). **DURING OPERATION** - Disturbance and mortality of reptiles through increased predation and human activity.	Small	Major to moderate adverse	Negligible	Negligible (opportunity for beneficial)

F11.0 Abbreviations & Definitions

- AADT - Average Annual Daily Traffic
- BMERC - Buckinghamshire and Milton Keynes Environmental Records Centre
- BNS - Biological Notification Site
- BOA - Biodiversity Opportunity Area
- CEMP - Construction Environmental Management Plan
- CIEEM - Chartered Institute of Ecology and Environmental Management
- COSHH - Control of Substances Hazardous to Health Regulations 2002
- DMRB - Design Manual for Roads and Bridges
- EcIA - Ecological Impact Assessment
- eDNA - Environmental DNA
- EIA - Environmental Impact Assessment
- EPS - European Protected Species
- GCN - Great Crested Newts
- HIS - Habitat Suitability Index
- IRZ - Impact Risk Zone
- LBAP - Suffolk Biodiversity Action Plan
- LEMP - Landscape and Ecological Management Plan
- LNR - Local Nature Reserve
- LPA - Local Planning Authority
- LWS - Local Wildlife Site
- MAGIC - Multi Agency Geographic Information for the Countryside
- MKBAP - Milton Keynes Biodiversity Action Plan
- MKC - Milton Keynes Council
- MKWC - Milton Keynes Wildlife Corridor
- NNR - National Nature Reserve
- NPPF - National Planning Policy Framework 2019
- NERC Act - Natural Environment and Rural Communities Act 2006
- PRoW - Public Right of Way
- RPA - Root Protection Area
- SAC - Special Area of Conservation
- SPA - Special Protection Area
- SQI - Species Quality Index
- SSSI - Site of Special Scientific Interest
- SuDS - Sustainable Drainage System
- TN - Target Note

- UKBAP - UK Biodiversity Action Plan
- WFD - Water Framework Directive
- ZoI - Zone of Influence

F12.0

References

1 Bat Conservation Trust (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines 3rd Edition. Bat Conservation Trust, London.

2 BRIG (ed. Ant Maddock) (2010) UK Biodiversity Action Plan; Priority Habitat Descriptions. http://jncc.defra.gov.uk/PDF/UKBAP_PriorityHabitatDesc-Rev2010.pdf (accessed March 2021).

3 BSI (2012) BS 5837:2012 'Trees in relation to design, demolition and construction - Recommendations'. British Standards Institution, London.

4 Buckinghamshire and Milton Keynes NEP (2014) Forward to 2020: Buckinghamshire and Milton Keynes Biodiversity Action Plan. Buckinghamshire and Milton Keynes Nature Environment Partnership (NEP), Aylesbury.

5 Cheffings, C.M. and Farrell, L. (eds.) (2005) The Vascular Plant Red Data List for Great Britain - Species Status No 7. Joint Nature Conservation Committee, Peterborough.

6 CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (Version 1.1). Chartered Institute of Ecology and Environmental Management, Winchester.

7 Cresswell, W. and Whitworth, R. (2004) An assessment of the efficiency of capture techniques and the value of different habitats for the great crested newt *Triturus cristatus*. English Nature Research Report 576. English Nature, Peterborough.

8 DEFRA (1997) The Hedgerow Regulations 1997: A guide to the law and good practice. Department for Environment, Food and Rural Affairs, London.

9 Environment Agency (2015) River Basin Management Plan, Anglian River Basin District. Environment Agency, Bristol.

10 Environment Agency (2019) Pollution prevention for businesses. Available from: https://www.gov.uk/guidance/pollution-prevention-for-businesses. (Accessed March 2021).

11 Highways England (2017) Smart Motorways Programme: M1 Junction 13-16; Bat Survey Report. Amey Arup Joint Venture, Amey, Birmingham.

12 Highways England (2017) Smart Motorways Programme: M1 Junction 13-16; Great Crested Newt Survey Report. Amey Arup Joint Venture, Amey, Birmingham.

13 JNCC (2010) Handbook for Phase 1 Habitat survey: a technique for environmental audit. Joint Nature Conservation Committee, Peterborough.

14 MAGIC (2021) Interactive Map. Available from: http://magic.defra.gov.uk/website/magic/ (Accessed March 2021).

15 Milton Keynes Council (2019) Plan:MK 2016-2031. Milton Keynes Council, Milton Keynes.

16 Milton Keynes Council (2020) Draft Biodiversity: Supplementary Planning Document, September 2020. Milton Keynes Council, Milton Keynes.

17 MHCLG (2019) National Planning Policy Framework. Ministry of Housing, Communities and Local Government, Crown Copyright.

18 Natural England (2018) Ancient woodland and veteran trees: protecting them from development. Available from: https://www.gov.uk/guidance/ancient-woodland-and-veteran-trees-protection-surveys-licences#ancient-woodland (Accessed March 2021).

19 Natural England (2009) Guidance on 'Current Use' in the definition of a Badger Sett. Natural England, Peterborough.

20 Natural England (2021) Designated Sites View. Available from: (https://designatedsites.naturalengland.org.uk/) (Accessed February 2021).

21 Office of the Deputy Prime Minister (ODPM) (2005) Government Circular: Biodiversity and Geological Conservation – Statutory Obligations and their Impact within the Planning System (ODPM 06/2005, Defra 01/2005). ODPM, London

22 Ratcliffe, D.A. (ed.) (1977) A Nature Conservation Review, Vols. 1 and 2. Cambridge University Press, Cambridge.

23 RHS (2019) Plants for Pollinators. Available from: https://www.rhs.org.uk/science/conservation-biodiversity/wildlife/plants-for-pollinators. Royal Horticultural Society.

24 RSPB (2015) Birds of Conservation Concern 4. Royal Society for the Protection of Birds, Bedfordshire.

25 Spellerberg, I.F. (1992) Evaluation and Assessment for Conservation. Chapman & Hall, London.

26 Stace, C. (2019) New Flora of the British Isles (Fourth edition). Cambridge University Press, Cambridge.

27 Usher, M.B. (ed.) (1986) Wildlife Conservation Evaluation. Chapman & Hall, London.

28 WSP (2008) Land South of Newport Pagnell -Extended Phase 1 Habitat Survey. Berkeley Strategic.