

**A38 Derby Junctions**

**TR010022**

**Volume 6**

**6.1 Environmental Statement**

**Chapter 8 - Biodiversity**

Regulation 5(2)(a)

Planning Act 2008

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

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Infrastructure Planning

Planning Act 2008

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

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Development Consent Order 202[ ]

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**6.1 Environmental Statement  
Chapter 8 Biodiversity**

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## 8. Biodiversity

### 8.1 Introduction and competent expert evidence

- 8.1.1 This chapter assesses the potential biodiversity impacts associated with the construction and operation of the Scheme, based upon the methodology set out in the Design Manual for Roads and Bridges (DMRB) (Volume 11, Section 2, Part 1 (Highways Agency, 2008), Part 2 Environmental Impact Assessment (Highways Agency, 2008) and Volume 11, Section 3, Part 4 Ecology and Nature Conservation (Highways Agency, 1993)); and associated Interim Advice Notes (IANs) (IAN 125/15 Environmental Assessment Update (Highways Agency, 2015); and IAN 130/10 Ecology and Nature Conservation: Criteria for Impact Assessment (Highways Agency, 2010)). The methodology used also draws upon the Guidelines of Ecological Impact Assessment in the UK and Ireland (Chartered Institute of Ecology and Environmental Management (CIEEM) Third Edition 2018), specific species technical assessment guidance (where applicable and appropriately referenced), and professional judgement.
- 8.1.2 This chapter details the methodology followed for the assessment, summarises the regulatory and policy framework related to biodiversity and describes the existing environment in the area surrounding the Scheme. Following this, the design and mitigation measures proposed to manage and minimise potential biodiversity impacts are specified, after which residual effects of the Scheme are presented. We also provide details of any assumptions and limitations made during the assessment.
- 8.1.3 This biodiversity assessment chapter is supported by Appendices 8.1 to 8.20 [TR010022/APP/6.3] as follows:
- Appendix 8.1: Summary of ecological surveys and studies to date.
  - Appendix 8.2: Habitat Regulations Assessment – No Significant Effects Report.
  - Appendices 8.3 to 8.15: Ecology survey reports for habitats and protected species (Appendices 8.8a, 8.8b, 8.8c, 8.10a, 8.10b, 8.11a, 8.11b are all confidential and are not published).
  - Appendix 8.16: Consultation meeting minutes.
  - Appendix 8.17: Details of statutory, non-statutory and non-designated sites located within 2km of the Scheme.
  - Appendix 8.18: Phase 1 habitat description and target notes.
  - Appendix 8.19: Letters of no impediment from Natural England (NE).
  - Appendix 8.20: Summary of biodiversity effects.
- 8.1.4 All figures cited within this chapter (Figures 8.1 to 8.36) are included within Environmental Statement (ES) Volume 2 [TR010022/APP/6.2]. However, Figures 8.19, 8.23 and 8.24 are confidential and thus are not published.

8.1.5 This chapter of the ES has been prepared by competent experts with relevant and appropriate experience. The technical lead for the biodiversity assessment has 12 years of relevant experience and has professional qualifications as follows: BSc Natural Sciences Dunelm (Biology, Psychology and Economics); Full Member of the Chartered Institute of Ecology and Environmental Management (MCIEEM); Practitioner Member of the Institute of Environmental Management and Assessment (PIEMA); and NE survey licences for great crested newts and bats. The chapter has been reviewed by an Associate Ecologist with over 30 years of relevant experience and qualifications; BSc Applied Biology, MPhil and Full Member of CIEEM; holder of NE Survey Class licence (Level 2) for great crested newts. Further details are provided in Appendix 1.1 [TR010022/APP/6.3].

## 8.2 Legislative and policy framework

8.2.1 As discussed in Chapter 1: Introduction, the primary basis for deciding whether to grant a Development Consent Order (DCO) is the National Policy Statement for National Networks (NPSNN) (Department for Transport (DfT), 2014) which, at Sections 4 and 5, sets out policies to guide how DCO applications will be decided and how the impacts of national networks infrastructure should be considered. Table 8.1 identifies the NPSNN policies that are relevant to the biodiversity assessment and where in this ES chapter information is provided to address these policy requirements.

**Table 8.1: Relevant NPSNN policies for the biodiversity assessment**

Relevant NPSNN para. ref.	Requirement of the NPSNN	Location where information addresses policy requirements
4.22	Prior to granting a Development Consent Order, the Secretary of State must, under the Habitats Regulations, consider whether it is possible that the project could have a significant effect on the objectives of a European site, or on any site to which the same protection is applied as a matter of policy, either alone or in combination with other plans or projects.	An Assessment of Implications on European Sites/ Habitats Regulations Assessment has been carried out. See Section 8.7 (Baseline Conditions) and Appendix 8.2 (Habitat Regulations Assessment - No Significant Effects Report)
4.23	Applicants are required to provide sufficient information with their applications for development consent to enable the Secretary of State to carry out an Appropriate Assessment if required. This information should include details of any measures that are proposed to minimise or avoid any likely significant effects on a European site. The information provided may also assist the Secretary of State in concluding that an appropriate assessment is not required because significant effects on European sites are sufficiently unlikely that they can be excluded.	[TR010022/APP/6.3].

Relevant NPSNN para. ref.	Requirement of the NPSNN	Location where information addresses policy requirements
5.22	Where the project is subject to Environmental Impact Assessment (EIA) the applicant should ensure that the environmental statement clearly sets out any likely significant effects on internationally, nationally and locally designated sites of ecological or geological conservation importance (including those outside England) on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity and that the statement considers the full range of potential impacts on ecosystems.	The assessment of likely significant effects is detailed in Section 8.10 (Assessment of likely significant effects).
5.23	The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests.	Refer to Section 8.9 (Design, mitigation and enhancement measures).
5.24	Halt overall biodiversity loss; support healthy well-functioning ecosystems and establish coherent ecological networks, with more and better places for nature for the benefit of wildlife and people. This aim needs to be viewed in the context of the challenge of climate change.	Refer to Section 8.10. (Assessment if likely significant effects – ecosystems and climate change).
5.25	Development should avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives. Where significant harm cannot be avoided or mitigated, as a last resort, appropriate compensation measures should be sought.	Refer to Section 8.9 (Design, mitigation and enhancement measures).
5.26	In taking decisions, the Secretary of State should ensure that appropriate weight is attached to designated sites of international, national and local importance, protected species, habitats and other species of principal importance for the conservation of biodiversity, and to biodiversity and geological interests within the wider environment.	Refer to Section 8.3 (Assessment methodology) and Section 8.7 (Baseline conditions).
5.27	The most important sites for biodiversity are those identified through international conventions and European Directives. The Habitats Regulations provide statutory protection for European sites. The National Planning Policy Framework states that the following wildlife sites should have the same protection as European 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 European sites, potential Special Protection Areas, possible Special Areas of Conservation and listed or proposed Ramsar sites.	Refer to Section 8.3. (Assessment methodology).
5.28	Many Sites of Special Scientific Interest (SSSIs) are also designated as sites of international importance and will be protected accordingly. Those that are not, or those features of SSSIs not covered by an international designation, should be given a high degree of protection. All National Nature Reserves are notified as SSSIs.	Refer to Section 8.3 (Assessment methodology).



Relevant NPSNN para. ref.	Requirement of the NPSNN	Location where information addresses policy requirements
5.29	Where a proposed development on land within or outside a SSSI is likely to have an adverse effect on an SSSI (either individually or in combination with other developments), development consent should not normally be granted. Where an adverse effect on the site's notified special interest features is likely, an exception should be made only where the benefits of the development at this site clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest, and any broader impacts on the national network of SSSIs.	Refer to Appendix 8.17 (Details of statutory sites located within 2km of the Scheme scoped in/out of assessment) [TR010022/APP/6.3] and Section 8.10 (Assessment of likely significant effects).
5.31	Sites of regional and local biodiversity and geological interest (which include Local Geological Sites, Local Nature Reserves and Local Wildlife Sites and Nature Improvement Areas) have a fundamental role to play in meeting overall national biodiversity targets, in contributing to the quality of life and the well-being of the community, and in supporting research and education. The Secretary of State should give due consideration to such regional or local designations. However, given the need for new infrastructure, these designations should not be used in themselves to refuse development consent.	Refer to Section 8.3, (Assessment methodology); Section 8.7 (Baseline conditions); Section 8.10 (Assessment of likely significant effects); and Appendix 8.17 (Details of statutory sites located within 2km of the Scheme scoped in/out of assessment) [TR010022/APP/6.3].
5.32	Ancient woodland is a valuable biodiversity resource both for its diversity of species and for its longevity as woodland. Once lost it cannot be recreated. The Secretary of State should not grant development consent for any development that would result in the loss or deterioration of irreplaceable habitats including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the national need for and benefits of the development, in that location, clearly outweigh the loss. Aged or veteran trees found outside ancient woodland are also particularly valuable for biodiversity and their loss should be avoided. Where such trees would be affected by development proposals, the applicant should set out proposals for their conservation or, where their loss is unavoidable, the reasons for this.	Refer to Section 8.3, (Assessment methodology); Section 8.7 (Baseline); and Section 8.10 (Assessment of likely significant effects – habitats).
5.33	Development proposals potentially provide many opportunities for building in beneficial biodiversity or geological features as part of good design. When considering proposals, the Secretary of State should consider whether the applicant has maximised such opportunities in and around developments. The Secretary of State may use requirements or planning obligations where appropriate in order to ensure that such beneficial features are delivered.	Refer to Section 8.9 (Design, mitigation and enhancement measures).

Relevant NPSNN para. ref.	Requirement of the NPSNN	Location where information addresses policy requirements
5.34	Many individual wildlife species receive statutory protection under a range of legislative provisions.	Refer to Section 8.3 (Assessment methodology) and Section 8.10 (Assessment of likely significant effects).
5.35	Other species and habitats have been identified as being of principal importance for the conservation of biodiversity in England and Wales and therefore requiring conservation action. The Secretary of State should ensure that applicants have taken measures to ensure these species and habitats are protected from the adverse effects of development. Where appropriate, requirements or planning obligations may be used in order to deliver this protection. The Secretary of State should refuse consent where harm to the habitats or species and their habitats would result, unless the benefits of the development (including need) clearly outweigh that harm.	
5.36	<p>Applicants should include appropriate mitigation measures as an integral part of their proposed development, including identifying where and how these will be secured. In particular the applicant should demonstrate that:</p> <ul style="list-style-type: none"> <li>• during construction, they will seek to ensure that activities will be confined to the minimum areas required for the works;</li> <li>• during construction and operation, best practice will be followed to ensure that risk of disturbance or damage to species or habitats is minimised (including as a consequence of transport access arrangements);</li> <li>• habitats will, where practicable, be restored after construction works have finished;</li> <li>• developments will be designed and landscaped to provide green corridors and minimise habitat fragmentation where reasonable;</li> <li>• opportunities will be taken to enhance existing habitats and, where practicable, to create new habitats of value within the site landscaping proposals, for example through techniques such as the 'greening' of existing network crossing points, the use of green bridges and the habitat improvement of the network verge.</li> </ul>	Refer to Section 8.9 (Design, mitigation and enhancement measures).
5.38	The Secretary of State will need to take account of what mitigation measures may have been agreed between the applicant and NE and/or the MMO, and whether NE and/or the MMO has granted or refused, or intends to grant or refuse, any relevant licences, including protected species mitigation licences.	Refer to Appendix 8.19 (Letters of No Impediment from NE) [TR010022/APP/6.3].

8.2.2 Other relevant policies have been considered as part of the biodiversity assessment where these have informed the identification of receptors and resources and their sensitivity; the assessment methodology; the potential for significant environmental effects; and required mitigation. These policies include:

- National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, 2019): Section 15 paragraphs 170 - 177 Conserving and Enhancing the Natural Environment (including protection and enhancement of biodiversity; provision of measurable net gain for biodiversity; and creating/maintaining coherent ecological networks). In accordance with the NPPF, the NPSNN policies are the primary source of policy guidance regarding this assessment. The NPPF was revised in 2019, but the requirements which relate to this assessment have not substantively changed, and the NPSNN remains the primary source of policy guidance.
- City of Derby Local Plan Review (2006) (Derby City Council (DCiC), 2006).
- Derby City Local Plan – Part 1 Core Strategy (2017) (DCiC, 2017): relevant Core Principals (CP) include:
  - CP 16 Green Infrastructure (maintain, enhance and manage Derby's green infrastructure, and ensure that land is available and managed to assist in adapting to and mitigating against climate change).
  - CP 18 Green Wedges (ensure improvements which provide multiple benefits to Derby's green infrastructure or which link the Green Wedge to the wider Green Infrastructure network).
  - CP 19 Biodiversity (assets will be protected, enhanced, managed, restored, strengthened and created in a manner appropriate to their significance).
- Derby Local Transport Plan LTP3 (2011 - 2026) (DCiC, 2011): promoting investment in transport that enhances the urban and natural environment.
- Erewash Core Strategy (March 2014) (Erewash Borough Council (EBC), 2014), noting that there are some policies saved from the previous 2005 Local Plan (EBC, 2014): relevant policies include:
  - Policy 16 Green Infrastructure (new or enhanced green infrastructure corridors, inclusive and multi-functional, with biodiversity provision and opportunities).
  - Policy 17 Biodiversity (protect, restore, expand and enhance biodiversity).
  - Policy EV10 Sites of Special Scientific Interest, Regionally Important Geological Sites and Geomorphological Sites, Local Nature Reserves and Sites of Importance for Nature Conservation.
  - Policy EV11 Protected Species and Threatened Species.
  - Policy EV12 Nature Conservation Planning Obligations and Conditions.
  - Policy EV13 Creative Conservation.
  - Policy EV14 Protection of Trees and Hedgerows.
- Derbyshire Local Transport Plan (2011 - 2026) (Derbyshire Country Council (DCC), 2011): relevant Strategic Environmental Assessment (SEA) objectives include:

- SEA2 Protect and enhance nature (biodiversity, geodiversity, wildlife flora and fauna) and take measures to reduce habitat fragmentation and enhance connectivity.
- The Lowland Derbyshire Biodiversity Action Plan (LBAP) 2011 - 2020 (Lowland Derbyshire Biodiversity Partnership, 2017): aims to conserve and enhance existing wildlife and to redress past losses through habitat conservation, restoration, recreation and targets action for priority species.
- The Greenprint for Biodiversity in Erewash (Derbyshire Wildlife Trust, 2009): a framework for the conservation of biodiversity in Erewash Borough.
- Highways England – Our Plan to Protect and Increase Biodiversity (Highways England, 2015): The Highways England biodiversity plan provides a framework for identifying how Highways England intends to take biodiversity initiatives forward within the Road Investment Strategy (RIS) period. Its objectives are that by 2020, Highways England aims to reduce net loss of biodiversity, and that by 2040 it must deliver a net gain in biodiversity. The biodiversity plan supports the objectives of Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services (Defra, 2011) and the National Pollinator Strategy: for bees and other pollinators in England (Defra, 2014).
- Highways Agency Biodiversity Action Plan (BAP) (2002): Although now out of date, and superseded by the 2015 Biodiversity Plan, the 2002 BAP version still carries some relevance as it refers to specific species and habitats of conservation value associated with the existing road network.
- UK Post-2010 Biodiversity Framework (2012): The UK Post-2010 Biodiversity Framework was published on 17 July 2012. It was produced by Joint Nature Conservation Committee (JNCC) and Defra, on behalf of the Four Countries' Biodiversity Group (4CBG), through which the environment departments of all four governments in the UK work together. The UK BAP lists of priority species and habitats remain and have been used to help draw up statutory lists of priority species and habitats in England as required under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006; referred to as Habitats and Species of Principal Importance.
- The Natural Environment White Paper (Defra, 2011): The paper sets out a framework for protecting and enhancing the natural environment, to be backed up with targets for practical action to halt the loss of UK and international species and habitats.
- A Green Future: A 25 year Plan to Improve the Environment (Defra, 2018): Defra's 25 year environment plan contains targets to: a) restore 75% of our one million hectares (ha) of terrestrial and freshwater protected sites to favourable condition, securing their wildlife value for the long term; b) create or restore 500,000ha of wildlife-rich habitat outside the protected site network, focusing on priority habitats as part of a wider set of land management changes providing extensive benefits; and c) take action to recover threatened, iconic or economically important species of animals, plants and fungi, and where possible to prevent human induced extinction or loss of known threatened species in England (and overseas territories).

## 8.3 Assessment methodology

### Baseline data gathering process

8.3.1 The Scheme boundary as illustrated in Figure 2.4a and Figure 2.4b [TR010022/APP/6.2] includes land for the main highway infrastructure, as well as areas needed for construction, areas for flood storage, floodplain compensation, and ecological mitigation. Baseline information associated with the Scheme has been gathered between 2015 and 2018 and has informed the Scheme design and assessment process. The scope of the ecology surveys needed to enable baseline conditions to be defined has been discussed with statutory and non-statutory stakeholders as detailed in Section 8.4. Baseline ecological conditions near the Scheme are described in Section 8.7. A combination of desk study and field surveys has been used to adequately define baseline conditions for assessment purposes.

#### *Desk study*

8.3.2 The following organisations were contacted in 2018 to gain up to date information on existing ecological information (i.e. information on statutory and non-statutory designated sites and records of protected and notable species and habitats) up to 2km from the Scheme:

- Derbyshire Wildlife Trust (DWT).
- East Midlands Asset Delivery team (Area 7<sup>1</sup>) (Highways England).

8.3.3 Data searches relating to notable or protected species records up to 2km from the Scheme boundary were also requested from the following organisations:

- Derbyshire Mammal Group (DMG).
- Derbyshire Bat Group (DBtG).
- Derbyshire and Nottinghamshire Entomological Society (DNES).

8.3.4 In addition, online data resources were reviewed, including:

- Multi-Agency Geographic Information Centre (MAGIC)
- Highways England Environmental Information System (EnvIS).

8.3.5 As detailed in Figures 2.5, 2.6 and 2.7 [TR010022/APP/6.2], there are locations to the south of Kingsway junction, north of Kedleston Road junction, and both north and south of Little Eaton junction where minor highway improvement works would be undertaken as part of the Scheme – these locations are geographically separated from the main Scheme works, and would be required for signage works and associated road restraint systems within the existing highway verges (refer to Chapter 2: The Scheme, paras. 2.5.10, 2.5.25 and 2.5.36). Aerial photographs of these locations were reviewed in order determine habitat types present which were then ground-truthed via site visits (with the East Midlands Asset Delivery team (Highways England)).

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<sup>1</sup> Area 7 comprises approximately 79km of motorway and 428km of trunk roads in Nottinghamshire, Derbyshire, Leicestershire, Lincolnshire, Northamptonshire and Rutland. It includes stretches of the M1, M69, M6, as well as the A1, A14, A38 and A46

8.3.6 The results of the desk study are presented herein in Section 8.7. Previous desk studies conducted between 2015 and 2016 informed the scope of field surveys undertaken at that time, and the assessments undertaken to support the Scheme design development as detailed in Chapter 3: Scheme History and Assessment of Alternatives.

8.3.7 A summary of the desk studies conducted to date is provided in Appendix 8.1 [TR010022/APP/6.3], whilst Appendix 8.2 [TR010022/APP/6.3] provided details of the Habitat Regulations Assessment - No Significant Effects Report undertaken as based upon a review of desk study information.

**Field surveys**

8.3.8 The field surveys and associated survey reports used to inform this ecological impact assessment are summarised in Table 8.2, with further details presented in the various ecology survey reports provided in Appendices 8.3 to 8.15 [TR010022/APP/6.3]. Details regarding survey methodologies, dates, weather conditions and survey guidance used for each survey are available within the various baseline survey reports.

8.3.9 The information within the baseline reports as listed in Table 8.2 has been consolidated herein, with the most recent (within the last 2 years) and relevant data presented and referred to.

**Table 8.2: Summary of field surveys conducted at Kingsway junction, Markeaton junction and Little Eaton junction**

Habitat/species group	Survey	Kingsway and Markeaton junctions	Little Eaton junction	Appendix [TR010022/APP/6.3]
Habitats and flora species	Extended Phase 1 Habitat Survey of the Proposed Construction Compound at Markeaton <sup>2</sup> in 2018	✓	✗	Appendix 8.3(a)
	Walkover of the proposed road sign locations where access was available in 2018	✓	✓	N/A
	Extended Phase 1 Habitat Survey in 2017	✓	✓	Appendix 8.3(b)
	Extended Phase 1 Habitat Survey – Additional Areas in 2016	✓	✓	Not included*
	Extended Phase 1 Habitat Survey in 2015	✓	✓	Not included*
	Botanical Survey in 2018	✓	✓	Appendix 8.4(a)
	Botanical Survey in 2017	✓	✓	Appendix 8.4(b)
	Botanical Survey in 2015	✓	✓	Appendix 8.4(c)
	River Habitat Survey in 2018	✓	✓	Appendix 8.5(a)

<sup>2</sup> A construction compound at Markeaton junction has now been excluded from the Scheme proposals.

Habitat/ species group	Survey	Kingsway and Markeaton junctions	Little Eaton junction	Appendix [TR010022/APP/6.3]
	River Habitat and River Corridor Survey in 2015	✓	✓	Appendix 8.5(b)
Amphibians	Great Crested Newt Surveys in 2017	✓	✓	Appendix 8.6(a)
	Great Crested Newt Surveys in 2015	✓	✓	Appendix 8.6(b)
Reptiles	Reptile Surveys in 2018	✗	✓	Appendix 8.7(a)
	Reptile Surveys in 2017	✗	✓	Appendix 8.7(b)
	Reptile Surveys in 2015	✓	✓	Appendix 8.7(c)
Birds	Barn Owl Inspection in 2018	✗	✓	Appendix 8.8(a) (Confidential)
	Breeding Bird Survey in 2017	✓	✓	Appendix 8.8(b) (Confidential)
	Breeding Bird Survey in 2015	✓	✓	Appendix 8.8(c) (Confidential)
	Wintering Bird Survey in 2017/2018	✗	✓	Appendix 8.8(d)
	Wintering Bird Survey in 2016/2017	✗	✓	Appendix 8.8(e)
	Wintering Bird Survey in 2015/2016	✗	✓	Not included*
Bats	Bat Roost Surveys in 2018	✓	✓	Appendix 8.9(a)
	Bat Roost Surveys – Buildings and Structures, in 2017	✓	✓	Appendix 8.9(b)
	Bat Activity Surveys in 2017	✓	✓	Appendix 8.9(c)
	Bat Trapping and Radio Tracking Surveys at Markeaton in 2017	✓	✗	Appendix 8.9(d)
	Bat Roost and Activity Surveys in 2015 (incl. Bat Trapping Surveys at Little Eaton in 2015)	✓	✓	Appendix 8.9(e)
Badgers	Badger Survey in 2018	✓	✓	Appendix 8.10(a) (Confidential)
	Badger Territory Analysis Survey in 2017	✓	✓	Appendix 8.10(b) (Confidential)
	Badger Survey in 2016	✓	✓	Not included*
	Badger Survey in 2015	✓	✓	Not included*
Riparian mammals	Water Vole and Otter Survey in 2018	✗	✓	Appendix 8.11(a) (Confidential)
	Water Vole and Otter Survey in 2017	✓	✓	Appendix 8.11(b) (Confidential)
	Water Vole and Otter Survey in 2015	✓	✓	Not included*

Habitat/species group	Survey	Kingsway and Markeaton junctions	Little Eaton junction	Appendix [TR010022/APP/6.3]
White-clawed crayfish	White-clawed Crayfish Survey in 2018	x	✓	Appendix 8.12(a)
	White-clawed Crayfish Survey in 2017	x	✓	Appendix 8.12(b)
	White-clawed Crayfish Survey in 2015	✓	✓	Appendix 8.12(c)
Terrestrial invertebrates	Terrestrial Invertebrate Survey in 2018	✓	✓	Appendix 8.13(a)
	Terrestrial Invertebrate Survey in 2015	✓	✓	Appendix 8.13(b)
Aquatic macroinvertebrates	Aquatic Macroinvertebrate Survey in 2018	✓	✓	Appendix 8.14
	Aquatic Macroinvertebrate Survey in 2017	x	✓	Not included*
	Aquatic Macroinvertebrate Survey in 2015	✓	✓	Not included*
Fish	Fish Survey in 2018	x	✓	Appendix 8.15

\*Report not included as an Appendix – baseline data updated in full and results referenced in the updated survey report(s) where applicable or results now not applicable to the Scheme boundary

## Ecological assessment

8.3.10 The method used for the ecological impact assessment as reported herein is based upon the following guidance:

- DMRB Volume 11, Section 2, Part 1 and Part 2 Environmental Impact Assessment (Highways Agency, 2008) and associated IAN 125/15 Environmental Assessment Update (Highways Agency, 2015).
- DMRB Volume 11, Section 3, Part 4 Ecology Nature Conservation (Highways Agency, 1993) and associated IAN 130/10 Ecology and Nature Conservation: Criteria for Impact Assessment (Highways Agency, 2010).
- Guidelines of Ecological Impact Assessment in the UK and Ireland (CIEEM Third Edition, 2018) hereafter referred to as the CIEEM guidelines.
- Specific species technical assessment guidance (where applicable and appropriately referenced).
- Professional judgement.

8.3.11 The scope of the ecological impact assessment covers the following:

- Assigning ecological importance, based on a geographical approach, to ecological features present within the applicable study area (refer to Section 8.7).



- Characterisation of ecological impacts on specific features (considering impact avoidance design measures, standard management activities and mitigation measures as detailed in Section 8.9).
- Determination of the significance of effects by consideration of the importance of the ecological feature, and the characterisation of the ecological impact on each specific feature.

8.3.12 The sections below provide details regarding the assignment of ecological importance, characterisation of ecological impacts, and definition of significant effects.

### ***Ecological Importance***

8.3.13 Table 8.3 illustrates a hierarchical geographical approach used to assigning ecological feature importance as based upon DMRB IAN 130/10 (Highways Agency, 2010)<sup>3</sup>. The NPSNN (DfT, 2014) refers to these scales and the relevant paragraphs are noted.

**Table 8.3: Ecological Importance**

Importance <sup>4</sup>	Criteria from DMRB (IAN 130/10) and reference to NSPNN
International or European	<p><b>NPSNN: (5.27) International Sites</b></p> <p>An internationally designated site or candidate site including; Special Protection Areas (SPA); potential SPAs (pSPAs); Special Areas of Conservation (SAC); candidate or possible SACs (cSACs or pSACs<sup>5</sup>); and Wetlands of International Importance (Ramsar sites).</p> <p>Biogenetic Reserves, World Heritage Sites and Biosphere Reserves.</p> <p>Areas which meet the published selection criteria for those sites listed above but which are not themselves designated as such.</p> <p>Resident or regularly occurring populations of species which may be considered at an International or European level<sup>6</sup> where:</p> <ul style="list-style-type: none"> <li>• The loss of these populations would adversely affect the conservation status or distribution of the species at this geographic scale.</li> <li>• The population forms a critical part<sup>7</sup> of a wider population at this scale, or</li> <li>• The species is at a critical phase<sup>8</sup> of its life cycle at this scale.</li> </ul>

<sup>3</sup> It is acknowledged that 'Importance' is used rather than 'Value' in the CIEEM 2018 guidance for ecological features compared to DMRB; however, the geographical frames of reference and method of determination used in the assessment is similar. 'Importance' and/or 'Value' for ecological features is comparable. Importance has been used within the assessment reported herein.

<sup>4</sup> It is noted that consultation with the Statutory Environmental Body (SEB) and/or the County Ecologist is required when assigning the nature conservation importance of ecological resources, as per IAN 130/10 (Highways Agency, 2010). This has been undertaken as part of the consultation process – refer to Section 8.4.

<sup>5</sup> pSACs are sites which have been formally advised by to UK Government, but have not yet been submitted to the European Commission. These sites should be of International (European) importance on the basis that they meet the relevant selection criteria for a SAC but are not yet designated as such.

<sup>6</sup> Such species include those listed within the Directive 2009/147/EC on the Conservation of wild birds (i.e. EC Birds Directive) (codified version of Council Directive 79/409/EEC as amended) or animal/plant species listed within Council Directive 92/43/EEC on the Conservation of natural habitats and of wild flora and fauna (i.e. Habitats Directive).

<sup>7</sup> Such populations include sub-populations that are essential to maintenance of metapopulation dynamics e.g. critical emigration/immigration links between otherwise discrete populations.

<sup>8</sup> Seasonal activity or behaviour upon which survival or reproduction depends.

Importance <sup>4</sup>	Criteria from DMRB (IAN 130/10) and reference to NSPNN
UK or National	<p><b>NPSNN: (5.28) Sites of Special Scientific Interest (SSSI), (5.30) Marine Conservation Zones not present, (5.32) Irreplaceable habitats including ancient woodland</b></p> <p>Sites designated at national UK level e.g. Sites of Special Scientific Interest (SSSI); Marine Protection Areas (MPAs) including Marine Conservation Zones (MCZs); and National Nature Reserves (NNR).</p> <p>Areas which meet the published selection criteria for those sites listed above but which are not themselves designated as such.</p> <p>Areas of key or priority habitats identified in the UK Post-2010 Biodiversity Framework i.e. UK Biodiversity Action Plan (BAP), including those published in accordance with Section 41 of the Natural Environment and Rural Communities Act (2006) and those considered to be of principal importance for the conservation of biodiversity.</p> <p>Areas of ancient woodland i.e. woodland listed within the Ancient Woodland Inventory.</p> <p>Resident or regularly occurring populations of species which may be considered at a National or UK level<sup>9</sup> where:</p> <ul style="list-style-type: none"> <li>• The loss of these populations would adversely affect the conservation status or distribution of the species at this geographic scale.</li> <li>• The population forms a critical part of a wider population at this scale, or</li> <li>• The species is at a critical phase of its life cycle at this scale.</li> </ul>
Regional	<p><b>NPSNN: (5.31) Regional and Local Sites</b></p> <p>Habitats or populations of species of importance at a regional level (i.e. Central England).</p> <p>Areas of key or priority habitat identified as being of Regional importance in the appropriate Natural Area profile (or equivalent).</p> <p>Key or priority habitat or species listed within the Highways Agency BAP.</p> <p>Resident or regularly occurring populations of species which may be considered at a Regional level<sup>10</sup> where:</p> <ul style="list-style-type: none"> <li>• The loss of these populations would adversely affect the conservation status or distribution of the species at this geographic scale.</li> <li>• The population forms a critical part of a wider population at this scale, or</li> <li>• The species is at a critical phase of its life cycle at this scale.</li> </ul>
County or Unitary Authority	<p><b>NPSNN: (5.31) Regional and Local Sites, (5.34) Protection of other habitats and species</b></p> <p>Habitats or populations of species of importance at a County (i.e. Derbyshire) level.</p> <p>Designated sites, such as County Wildlife Sites (CWS), Local Wildlife Sites (LWS) or Sites of Importance for Nature Conservation (SINCs), and Local Nature Reserves (LNRs) designated in the County or Unitary Authority Area i.e. District context.</p> <p>Areas which meet the published selection criteria for those sites listed above but which are not themselves designated as such.</p> <p>Areas of key or priority habitats identified in the Local BAP.</p>

<sup>9</sup> Species which may be considered at the UK or National level means; birds, other animals and plants which receive legal protection in the basis of their conservation interest (those listed within the Wildlife and Countryside Act 1981 (as amended) Schedule 1, 5 and 8); species listed for their principal importance for biodiversity (in accordance with the Natural Environment and Communities Act 2006 Section 41 England); priority species listed within the UK Post 2010 Biodiversity Framework (i.e. UKBAP); or species listed within the Red Data Book.

<sup>10</sup> Such species include those listed in the appropriate Natural Area Profile and key/priority species listed on the Highways Agency BAP.

Importance <sup>4</sup>	Criteria from DMRB (IAN 130/10) and reference to NSPNN
	<p>Resident or regularly occurring populations of species which may be considered at a County (or District) level<sup>11</sup> where:</p> <ul style="list-style-type: none"> <li>• The loss of these populations would adversely affect the conservation status or distribution of the species at this geographic scale.</li> <li>• The population forms a critical part of a wider population at this scale, or</li> <li>• The species is at a critical phase of its life cycle at this scale.</li> </ul>
Local	<p><b>NPSNN: (5.33) Biodiversity within and around developments</b></p> <p>Habitats or species populations of importance in a local (i.e. within ~5km of the site) context.</p> <p>Designated sites include LNRs designated in the Local context.</p> <p>Trees that are protected by Tree Preservation Orders (TPOs).</p> <p>Areas of habitat; or populations/communities of species considered to appreciably enrich the habitat resource within the local context (such as veteran trees), including features of importance for migration, dispersal or genetic exchange.</p>
Site	<p>(Not defined in DMRB)</p> <p>Habitat that is of importance in the context of the site only.</p> <p>Populations of common and widespread species.</p> <p>A degraded or impoverished example of a common or widespread habitat in the local area.</p>

8.3.14 As well as assigning importance, there is also a need to identify all legally protected species that could be affected by the Scheme in order that measures can be taken to ensure adherence to relevant legislation. This may include the adoption of mitigation and appropriate licensing which is acceptable to NE.

***Characterisation of ecological impacts***

8.3.15 Based upon IAN 130/10 (Highways Agency, 2010) and the CIEEM guidelines (CIEEM, 2018), when describing potential ecological impacts, reference is made to the following, where applicable (as detailed in Appendix 8.20: Summary of Biodiversity Effects [TR010022/APP/6.3]):

Sign (SI):

- Positive (beneficial; +ve) or Negative (adverse; -ve) impact.
- Probability of occurring (PO):
  - Confidence in predictions (levels of certainty that an impact would occur as predicted), based on the following four point scale:
    - Certain or near certain (≥ 95% probability).
    - Probable (50 - 95% probability).
    - Unlikely (5 - 49% probability).
    - Extremely unlikely (≤ 5% probability).

<sup>11</sup> Such species include those at County level (i.e. Derbyshire) including Unitary Authority Area i.e. District level (i.e. Derby and Erewash); as listed on the Local BAPs; and listed as a county designated site.

Complexity (CO):

- Direct or indirect impacts:
  - Both direct and indirect impacts are considered within the assessment. A direct impact is directly attributable to a defined action such as the physical loss of a habitat or the immediate mortality of an individual of a particular species. Indirect impacts are attributable to an action, but which affect ecological resources through effects on an intermediary ecosystem, process or feature. An example of an indirect effect would be the loss of an important prey species for a predator.
- Cumulative impacts:
  - Effects on the environment caused by the combined results of past, current and future activities (refer to Chapter 15: Assessment of Cumulative Effects).

Extent (EC):

- Spatial or geographical area over which the impact or effect may occur.

Size (SZ):

- Description of level of severity of influence (e.g. amount, intensity, percentage, complete loss, number of animals affected). Also, referred to as magnitude, determined on a quantitative basis if possible.
- When the feature being considered is a habitat itself, size (magnitude) and extent may be synonymous.

Reversibility (RE):

- Reversible (temporary) or not reversible (permanent) impact (can the impact or effect be reversed, whether this is planned or not).

Duration (DU):

- The time for which an impact is expected to last prior to recovery or replacement of the resource or feature. This is in ecological terms (e.g. in relation to the life-cycle of the feature) not human timeframes.

Timing and frequency (TF):

- Important seasonal or life-cycle constraints and any relationship with frequency considered e.g. bird nesting season.

**Significance of effects**

- 8.3.16 The significance of an effect is largely a product of the importance of the ecological feature and the characterisation of the ecological impact, supplemented by professional judgement.

8.3.17 Based upon CIEEM guidelines (CIEEM, 2018), a significant effect, in ecological terms, is defined as:

*“For the purpose of ecological impact assessment, ‘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)”.*

8.3.18 Effects can be considered significant at a wide range of geographic scales from international, to European, to local.

8.3.19 Table 8.4, adopted from IAN 130/10 (Highways Agency, 2010), illustrates the approach to relating significant effects on ecological features at different levels of importance. The significance of effects is categorised as very large, large, moderate, slight, or neutral. IAN 130/10 uses a slightly different terminology to the CIEEM guidelines to grade the significance of effects. However, the IAN 130/10 approach is fully compatible with the CIEEM guidelines approach and does not alter the conclusions which have been reached in this assessment.

8.3.20 The approach adopted herein aims to determine whether an effect is either significant or not significant based on an assessment of the factors which characterise it i.e. the ecological significance of an effect is not dependent on the importance of the feature in question. The importance of any feature that would be significantly affected is used to assist in determining the geographical scale at which the effect is significant, for example *‘an ecologically significant effect on a feature of importance at county level’* (in CIEEM guideline terms) is generally regarded as a ‘moderate significant effect’ (in DMRB terms) as per Table 8.4. This in turn is used to determine the implications in terms of legislation, policy or development control.

8.3.21 Note that Table 8.4 is used as a guide and professional judgement has also been used to determine the significance of ecological effects. Table 8.4 illustrates an approach and comparison to the overall ‘significance categories’ used by other topic areas. In relation to these categories, a significant effect in relation to the EIA Regulations (refer to Chapter 1: introduction, Section 1.3) is one which is identified as being of moderate or greater significance (these being considerations that are either important, material or key factors in the decision-making process). Refer to Chapter 4: Environmental Impact Assessment Methodology, Section 4, Table 4.5 para. 4.3.16 for details.

**Table 8.4: Significance of ecological effects**

Biodiversity significance category CIEEM (2018)	Biodiversity significance category DMRB	Typical descriptors of effect (Biodiversity)	Effect significance in relation to EIA Regulations and in comparison with other topics
International or European UK or National	Very large	Generally, an impact on one or more features(s) of International, European or National or UK Importance. NOTE: only adverse (negative) effects are normally assigned this level of significance. They should be considered to represent key factors in	Significant

Biodiversity significance category CIEEM (2018)	Biodiversity significance category DMRB	Typical descriptors of effect (Biodiversity)	Effect significance in relation to EIA Regulations and in comparison with other topics
		the decision-making process.	
Regional	Large	Generally, an impact on one or more feature(s) of Regional Importance. NOTE: these beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.	
County or Unitary Authority	Moderate	Generally, an impact on one or more feature(s) of County or Unitary Authority Area Importance. NOTE: these beneficial or adverse effects are unlikely to be critical in the decision-making process but are important in enhancing the subsequent design of the project.	
Local	Slight	Generally, an impact on one or more feature(s) of Local Importance. NOTE: these beneficial or adverse effects are unlikely to be critical in the decision making process but are important in enhancing the subsequent design of the project.	Not significant
Site	Neutral	No significant impacts on key nature conservation features. NOTE: absence of effects, or those that are beneath levels of perception.	Neutral

8.3.22 For the purposes of this assessment, effects are assessed in detail only for those features that are of at least local importance or are subject to some form of legal protection. In terms of protected species, it should be noted that irrespective of the significance of the ecological effect, mitigation would be required to ensure the law is not contravened.

8.3.23 This assessment takes into account impact avoidance measures i.e. design measures that have been incorporated into the Scheme design to avoid or reduce (embedded mitigation measures) impacts, as well as standard mitigation and management activities (refer to Section 4.3). Additional specific mitigation measures are also considered, with characterisation of impacts and residual effects identified. The significance of any residual effects is assessed herein, considering any additional mitigation measures in accordance with Table 8.4. The residual effects, together with an assessment of the likelihood of success of the proposed mitigation approach, are the factors to be considered against legislation, policy and development control requirements.

## No-net loss

- 8.3.24 An objective of the Scheme is to achieve no-net loss (NNL) in biodiversity, which aligns with the objectives of the Highways England Biodiversity Plan (Highways England, 2015) to reduce NNL in biodiversity by 2020. The NPPF (Ministry of Housing, Communities and Local Government, 2019) sets out the Government's planning policies for England. In accordance with the NPPF, the NPSNN (DfT, 2014) policies relating to the applicant's assessment are the primary source of policy guidance regarding this assessment. The NPPF provides policy guidance for the development of local plans, and it is acknowledged that the NPPF does not contain specific policies for Nationally Significant Infrastructure Projects (NSIPs) such as the Scheme (refer to Chapter 1: introduction, Section 1.3). However, matters that the government consider 'important and relevant' when making decisions on NSIP applications includes the NPPF. The NPPF has, therefore, been considered in the assessment. The NPPF contains similar biodiversity provisions to the NPSNN, however, the NPPF refers to provision for 'enhancements' and 'measurable net gains for biodiversity'. Measures that aim to minimise adverse impacts upon biodiversity as well as enhance biodiversity (where possible) have been included in the Scheme design where applicable. Aspirational enhancement measures (which could be delivered outside of the Scheme DCO application) are also mentioned (refer to Section 8.5); however, these have not been included in the assessment of residual ecological effects. An NNL biodiversity assessment (based on a suitable metric methodology) has been undertaken and is reported separately to this assessment. Opportunities to achieve NNL (and potentially net gains) in biodiversity within the Scheme boundary based on the Defra metric are being sought to aim to comply with Highways England internal policy guidelines. This approach, however, focuses primarily on NNL of flora habitats.
- 8.3.25 This chapter details whether the Scheme has met the objective of achieving NNL in biodiversity based on the Scheme-related impacts on biodiversity, balanced by measures taken to avoid, minimise, restore or offset significant residual effects, if any, on an appropriate geographic scale (e.g. local, county, regional).

## Scoping

- 8.3.26 The proposed scope of the biodiversity assessment was detailed in the EIA Scoping Report (Highways England, 2018) submitted to The Inspectorate on 15 March 2018 (refer to Chapter 1: Introduction, para. 1.3.5).
- 8.3.27 An overview of The Inspectorate's Scoping Opinion (refer to Appendix 4.1 [TR010022/APP/6.3]) in relation to biodiversity is presented in Table 8.5, together with comments provided by statutory consultees, including the late consultation responses published on 26 April 2018. Where the assessment has been undertaken in accordance with the Scoping Opinion point, a response and the relevant ES section is provided; where an alternative approach has been agreed with the relevant stakeholders, an explanation is provided.
- 8.3.28 As detailed in Table 8.5, the EIA Scoping Report suggested scoping out several ecological sites from assessment. As required by The Inspectorate, Section 8.7 includes a further evaluation as to which sites should be scoped in and out of the assessment.

8.3.29 As detailed in para. 8.3.5, minor highway improvement works comprising signage works and associated road restraint systems within the existing highway verges, are proposed in locations remote from the main construction works. Such works are assumed to have minimal impacts on biodiversity, whilst work activities would be localised and non-licensable, as agreed with stakeholders (see Section 8.4). As recommended following discussions with NE (see Section 8.4), mapping of habitats within these locations was undertaken via a site visit and by inspection of aerial photography. Prior to Scheme construction, such areas would be subject to pre-construction survey checks by an Ecological Clerk of Works. These precautionary measures would thus enable avoidance of potential harm to biodiversity (including slow worms at Little Eaton junction) associated with localised vegetation clearance (refer to Section 8.7). These locations are, therefore, scoped out of further assessment.



**Table 8.5: Scoping Opinion and response**

Scoping Opinion		
Points	Comments	Where addressed within the ES
<b>Planning Inspectorate</b>		
Designated and non-designated sites	The Inspectorate agrees there is no obvious impact pathway from the Proposed Development to European sites and on that basis impacts on European designated sites may be scoped out from further assessment.	Refer to Appendix 8.2 (Habitat Regulations Assessment - No Significant Effects Report) [TR010022/APP/6.3].
	<p>The Applicant has scoped out the following local wildlife sites (LWSs) because their distance from the Proposed Development, with housing developments or roads in between, and there is an absence of hydrological or habitat links to the Proposed Development:</p> <ul style="list-style-type: none"> <li><i>Osierbed and Gravelpit Woods LWS and Friar Gate Station LWS, Beech Wood LWS, Bunkers Wood LWS, Mickleover Egginton Greenway LWS, Inglewood Avenue Meadow LWS and Redbourn Lane Hedge LWS; Camp Wood LWS, Breadsall Disused Railway Cutting LWS, Breadsall Railway Cutting LWS, Darley Park LWS, Porter's Lane Pond LWS, High View South Community School Nature Reserve LWS, Porter's Lane Hedge LWS, Moor Road Fields LWS, Burley Hill Farm Scrub and Grassland LWS, Breadsall Priory Golf Course LWS and Ferriby Brook and Dam Brook Ferry Brook; Hatherings Wood LWS, Botany Stream Margin Complex LWS, Burley Wood LWS, Drum Hill Fields Breadsall Moor LWS, Eaton Parkwood LWS, Whitaker Lane Woodland LWS, Moor Plantation and Drumhill LWS, Great Farley's Wood LWS, Horsley Carr LWS and Woodlands School Hedge LWS.</i></li> </ul> <p>The Inspectorate considers that these sites cannot be scoped out from the assessment. The Scoping Report has not determined the location of diversionary routes during construction which could impact these sites. The biodiversity assessment should also consider interrelationships between aspects particularly air quality and noise assessments.</p>	Refer to Section 8.3 (Assessment methodology); and Appendix 8.17 (Designated and non-designated sites located within 2km of the Scheme scoped in/out of assessment) [TR010022/APP/6.3].
	<p>At present the following LWSs have been scoped into the ES because although located greater than 1km from the Proposed Development the LWSs appear to have habitat links which may be affected by the proposals, but this is to be reviewed:</p> <ul style="list-style-type: none"> <li><i>Kedleston Road Hedge LWS, Kedleston Road Marsh LWS and Markeaton Lane Meadow LWS.</i></li> </ul> <p>The Inspectorate recommends that the LWSs are scoped into the ES where linkages are demonstrated.</p>	
	<p>At present these LWSs have been scoped into the ES because although located greater than 250m from the Proposed Development the LWSs appear to have habitat and/or hydrological links which may be affected by the</p>	

Scoping Opinion		
Points	Comments	Where addressed within the ES
	<p>proposals, but this is to be reviewed:</p> <ul style="list-style-type: none"> <li><i>Burley Hill Farm Scrub and Grassland LWS and Peckwash Mills LWS</i></li> </ul> <p>The Inspectorate recommends that the LWSs are scoped into the ES where linkages are demonstrated.</p> <p>The Scoping Report indicates that these sites are located within 2km of Little Eaton junction with potential hydrological and/or habitat links to the site.</p> <ul style="list-style-type: none"> <li><i>Plantation site of interest, Boosemoor Brook, A38 Scrub, Ford Lane potential Local Wildlife Site (PLWS), Old Derby Canal, Marsh Area.</i></li> </ul> <p>The Inspectorate considers that an assessment of effects on these sites should be included where a link can be demonstrated. The Inspectorate notes that Ford Lane PLWS has been downgraded, therefore an assessment of effects on species and habitats rather on a potential designation should be included where relevant.</p>	
Great Crested Newts	Based on the absence of great crested newts in surveys in 2015 and 2017, the Inspectorate considers that further assessment of effects on this species may be scoped out. The ES should incorporate the baseline survey data that supports exclusion of this species from consideration.	Refer to Section 8.7 (Baseline conditions).
Assessment	The Inspectorate notes the proposed Assessment scope and methodology and advises that this approach should be discussed and agreed in consultation with the relevant consultation bodies including the relevant local planning authority, NE and the Environment Agency (EA).	Refer to Section 8.4 (Consultation – Table 8.4 and Table 8.5 – record of meetings with stakeholders). Also refer to Appendix 8.16 (Consultation meeting minutes) [TR010022/APP/6.3].
Study Area	The Inspectorate recommends that survey requirements for the ES are updated as set out in Chapter 9: Noise and Vibration, Sections 9.4 and 9.5 of the Scoping Report. The Inspectorate agrees that the scope of further surveys should be discussed and agreed in consultation with the relevant consultation bodies including the relevant local planning authority, NE and the EA.	Refer to Section 8.6 (Study area); and Section 8.4 (Consultation – Table 8.4 and Table 8.5 – record of meetings with stakeholders). Also refer to Appendix 8.16 (Consultation meeting minutes) [TR010022/APP/6.3].

<b>Scoping Opinion</b>		
<b>Points</b>	<b>Comments</b>	<b>Where addressed within the ES</b>
Mitigation, compensation and enhancement measures	<p>The Inspectorate recommends that any proposed mitigation and monitoring measures are agreed as far as possible with relevant consultees including NE, EA and the local planning authorities. The ES should detail all proposed mitigation measures and demonstrate how they will be secured.</p> <p>The identification of the compensation areas for replacement habitat suitable for little ringed plover nesting, and other replacement sites for those habitats lost to construction have not been provided in the Scoping Report. The ES should demonstrate the suitability of the selected compensation areas.</p> <p>The Inspectorate notes that the Scoping Report makes commitments with regard to ecological enhancement. The ES should commit to achievable ecological enhancement measures and provide the details for their design which have informed the assessment. The Inspectorate advises the Applicant to seek advice on the design of these measures from the relevant consultation bodies.</p>	Refer to Section 8.4 (Consultation – Table 8.4 and 8.5); and Section 8.9 (Design, mitigation and enhancement measures).
Protected species licencing	<p>The Inspectorate notes the potential impact on protected species, which may have implications for the design of the Proposed Development. These implications should be taken into account in the assessments in the ES.</p> <p>The ES should confirm whether any EPS licenses and/or mitigation licenses for other protected species would be required. If so, assurance should be provided to the Examining Authority that the necessary license(s) are likely to be obtained. The Applicant should seek to obtain letters of no impediment (LoNI) from NE. These should be appended to the ES. The Applicant is referred to the Inspectorate’s Advice Note 11, Annex C.</p>	Refer to Section 8.4 (Consultation – Table 8.5); Section 8.9 (Design, mitigation and enhancement measures); Section 8.10 (Assessment of likely significant effects); and Appendix 8.19 (Letters of No Impediment) [TR010022/APP/6.3].
<b>Environment Agency</b>		
Biodiversity	<p>The Environment Agency are satisfied that the A38 Derby Junctions – Environmental Impact Assessment Scoping Report March 2018 considers everything we would expect. There is mention of species surveys that were carried out in 2017 specifically White Clawed crayfish, water vole and otter which we would expect to see as part of the NSIP application.</p>	Refer to Section 8.7 (Baseline conditions); Appendix 8.11 (Water Vole and Otter Baseline Reports) and Appendix 8.12 (White Clawed Crayfish Baseline Reports) [TR010022/APP/6.3].

Scoping Opinion		
Points	Comments	Where addressed within the ES
<b>Natural England</b>		
Ecological Aspects of the ES	<p>NE advises that the potential impact of the proposal upon features of nature conservation interest and opportunities for habitat creation/enhancement should be included within this assessment in accordance with appropriate guidance on such matters. Guidelines for Ecological Impact Assessment (EclA) have been developed by the CIEEM and are available on their website.</p> <p>EclA is the process of identifying, quantifying and evaluating the potential impacts of defined actions on ecosystems or their components. EclA may be carried out as part of the EIA process or to support other forms of environmental assessment or appraisal.</p> <p>The National Planning Policy Framework sets out guidance in S.118 on how to take account of biodiversity interests in planning decisions and the framework that local authorities should provide to assist developers.</p>	Refer to Section 8.3 (Assessment methodology); Section 8.8 (Baseline conditions); Section 8.9 (Design, mitigation and enhancement measures); and Section 8.10 (Assessment of likely significant effects).
Internationally and Nationally Designated Sites	<p>The ES should thoroughly assess the potential for the proposal to affect designated sites. European sites (e.g. designated Special Areas of Conservation and Special Protection Areas) fall within the scope of the Conservation of Habitats and Species Regulations 2017. In addition, paragraph 118 of the National Planning Policy Framework requires that potential Special Protection Areas, possible Special Areas of Conservation, listed or proposed Ramsar sites, and any site identified as being necessary to compensate for adverse impacts on classified, potential or possible SPAs, SACs and Ramsar sites be treated in the same way as classified sites.</p> <p>Should a Likely Significant Effect on a European/Internationally designated site be identified or be uncertain, the competent authority (in this case the Local Planning Authority) may need to prepare an Appropriate Assessment, in addition to consideration of impacts through the EIA process.</p> <p>The development site is in close proximity to the following designated nature conservation site(s):</p> <ul style="list-style-type: none"> <li><i>Breadsall Railway Cutting SSSI and Kedleston Park SSSI.</i></li> </ul>	Refer to Section 8.7 (Baseline conditions) and Appendix 8.2 (Habitat Regulations Assessment – No Significant Effects Report) [TR010022/APP/6.3].
Regionally and Locally Important Sites	<p>The EIA will need to consider any impacts upon local wildlife and geological sites. Local Sites are identified by the local wildlife trust, geo-conservation group or a local forum established for the purposes of identifying and selecting local sites. They are of county importance for wildlife or geodiversity. The ES should therefore include an assessment of the likely impacts on the wildlife and geodiversity interests of such sites.</p> <p>The assessment should include proposals for mitigation of any impacts and if appropriate, compensation measures. Contact the local wildlife trust, geo-conservation group or local sites body in this area for further information.</p>	Refer to Section 8.3 (Assessment methodology); Section 8.6 (Assessment assumptions and limitations); and Section 8.10 (Assessment of likely significant effects); and Appendix 8.17 (Designated and non-designated sites located within 2km of the Scheme scoped in/out of

Scoping Opinion		
Points	Comments	Where addressed within the ES
		assessment) [TR010022/APP/6.3]. Refer to Chapter 10: Geology and Soils regarding Scheme impacts upon Local Geological Sites (formerly Regionally Important Geological Sites (RIGS)).
Protected Species - Species protected by the Wildlife and Countryside	<p>The ES should assess the impact of all phases of the proposal on protected species (including, for example, great crested newts, reptiles, birds, water voles, badgers and bats). NE does not hold comprehensive information regarding the locations of species protected by law but advises on the procedures and legislation relevant to such species. Records of protected species should be sought from appropriate local biological record centres, nature conservation organisations, groups and individuals; and consideration should be given to the wider context of the site for example in terms of habitat linkages and protected species populations in the wider area, to assist in the impact assessment.</p> <p>The area likely to be affected by the proposal should be thoroughly surveyed by competent ecologists at appropriate times of year for relevant species and the survey results, impact assessments and appropriate accompanying mitigation strategies included as part of the ES.</p>	Refer to Section 8.7 (Baseline conditions); and Section 8.10 (Assessment of likely significant effects).
Habitats and Species of Principal Importance	<p>The ES should thoroughly assess the impact of the proposals on habitats and/or species listed as 'Habitats and Species of Principal Importance' within the England Biodiversity List, published under the requirements of S41 of the NERC Act 2006. Section 40 of the NERC Act 2006 places a general duty on all public authorities, including local planning authorities, to conserve and enhance biodiversity.</p> <p>The development should seek if possible to avoid adverse impact on sensitive areas for wildlife within the site, and if possible provide opportunities for overall wildlife gain.</p>	Section 8.7 (Baseline conditions – Table 8.10 Importance of ecological features); and Section 8.10 (Assessment of likely significant effects).
Climate Change Adaptation	<p>The England Biodiversity Strategy published by Defra establishes principles for the consideration of biodiversity and the effects of climate change. The ES should reflect these principles and identify how the development's effects on the natural environment will be influenced by climate change, and how ecological networks will be maintained. The NPPF requires that the planning system should contribute to the enhancement of the natural environment 'by establishing coherent ecological networks that are more resilient to current and future pressures' (NPPF Para 109), which should be demonstrated through the ES.</p>	Refer to Section 8.10 (Assessment of likely significant effects – ecosystems and climate change).

Scoping Opinion		
Points	Comments	Where addressed within the ES
Contribution to local environmental initiatives and priorities	Green Infrastructure potential - The proposed development is within an area that NE considers could benefit from enhanced green infrastructure (GI) provision. As such, NE would encourage the incorporation of GI into this development.	Refer to Section 8.9 (Design, mitigation and enhancement measures); and Section 8.10 (Assessment of likely significant effects – ecosystems).  Also refer to Chapter 13: Road Drainage and the Water Environment regarding provision of green infrastructure such as sustainable drainage systems (SuDS).
Cumulative and in-combination effects	A full consideration of the implications of the whole Scheme should be included in the ES. All supporting infrastructure should be included within the assessment.  The ES should include an impact assessment to identify, describe and evaluate the effects that are likely to result from the project in combination with other projects and activities that are being, have been or will be carried out.  Ancient Woodland - addition to the S41 NERC Act paragraph: The ES should have regard to the requirements under the NPPF (Para. 118)2 which states:  <i>'Planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the need for, and benefits of, the development in that location clearly outweigh the loss.'</i>	Cumulative and in-combination effects are considered in Chapter 15: Assessment of Cumulative Effects.  Effects upon veteran trees are detailed in Section 8.10 (Assessment of likely significant effects – Habitats).

## 8.4 Consultation

- 8.4.1 Consultation with statutory and non-statutory consultees for the Scheme commenced in 2014 which confirmed the ecological survey approach with the following key ecology stakeholders: DCiC; DCC; DWT; the Environment Agency; East Midlands Asset Delivery team; and with NE. Additional consultation meetings have been held from 2015 through to 2018 where the findings from ecology surveys have been provided, the scope of recommended further surveys discussed, and early stage engagement opportunities sought for mitigation options, which have all fed into the ecological impact assessment process and mitigation strategy. A summary of stakeholder engagement meetings held to date, key comments raised and how these have been addressed in the ES is provided in Table 8.6 and Table 8.7, with full meeting minute records provided in Appendix 8.16 [TR010022/APP/6.3].
- 8.4.2 The Preliminary Environmental Information Report (PEIR) was published in September 2018 (Highways England, 2018) and presented the environmental information collected together with the preliminary findings of the assessment of likely significant environmental effects of the Scheme at the time. Table 8.8 provides a summary of comments received following statutory consultation on the PEIR, and how these have been addressed in the assessment (where applicable).

**Table 8.6: Summary of stakeholder engagement meetings with DCiC, DCC, DWT, Environment Agency and the East Midlands Asset Delivery team (Highways England)**

#	Date of meeting	Location	Key comments	Where addressed within the ES
M001	26.11.14	Aone+ <sup>12</sup> offices, Evo Park, Sherwood Business Park	Aone+ provided details of ecology and environment data to assist with the Scheme.	Refer to Section 8.3 (Assessment methodology).
M002	03.12.14	DWT office	Discussion on white-clawed crayfish, water vole, invertebrates and potential ecological mitigation and receptor areas.	Refer to Section 8.3 (Assessment methodology).
M003	04.06.15	DCC office	AECOM provided details on species surveys undertaken to date; outlined a programme of further surveys; and provided an over view of early stage high level mitigation. DWT identified three areas which may be considered for translocation/mitigation sites.	Refer to Section 8.6 (Study area); Section 8.7 (Baseline conditions); and Section 8.9 (Design, mitigation and enhancement measures).
M004	24.09.15	AECOM Nottingham office	AECOM provided an update on species surveys. A discussion was held on ways to potentially achieve net gains in biodiversity and ecosystem services. DCiC highlighted the potential to enhance the ecology around Markeaton Lake and Mill Pond as part of high-level mitigation.	Refer to Section 8.6 (Study area); Section 8.7 (Baseline conditions); and Section 8.9 (Design, mitigation and enhancement measures).
M005	22.09.16	On site – Markeaton Park and Mill Ponds, Mackworth Park and Ford Lane	A site visit was conducted to discuss potential opportunities to enhance sites adjacent, and connecting to, the Scheme. Considered and discussed broader initiatives such as green infrastructure and wider recreational/amenity benefits. Sought input from consultees on potential enhancement ideas to take forward.	Refer to Section 8.9 (Design, mitigation and enhancement measures).
M006	03.03.17	AECOM Nottingham office	Updated consultees on the Scheme. Provided a summary of previous ecology baseline surveys and assessment. Provided a project update regarding the next stage of assessment and proposed ecology surveys for 2017. Discussed surveys, and age of data, to support the ES. Discussed the next steps on continued engagement with NE on the project.	Refer to Section 8.3 (Assessment methodology); Section 8.7 (Baseline conditions); and Section 8.9 (Design, mitigation and enhancement measures).

<sup>12</sup> Note: Aone+ is now the East Midlands Asset Delivery team (Highways England)



#	Date of meeting	Location	Key comments	Where addressed within the ES
			Provided an update on potential use of off-site ecological mitigation areas.	
M007	23.03.18	AECOM Nottingham office	Updated consultees on the Scheme and next stage of assessment. Provided a summary of previous ecology baseline surveys from 2017. Discussed surveys proposed for 2018 and approach for the draft licences to support the ES. Outline mitigation and proposed approach for the no-net loss assessment.	Refer to Section 8.3 (Assessment methodology); Section 8.7 (Baseline conditions); Section 8.9 (Design, mitigation and enhancement measures); Section 8.10 (Assessment of likely significant effects).
M008	29.08.18	AECOM Nottingham office	Provided an update on the Scheme, programme and assessment. Summarised key points from the NE meeting on 06.06.18. Presented results of the baseline surveys gathered to date (where results were available at that time) and outline mitigation. Discussed the approach for the environmental assessment and methodology.	Refer to Section 8.3 (Assessment methodology); Section 8.6 (Study area); Section 8.7 (Baseline conditions); Section 8.9 (Design, mitigation and enhancement measures); Section 8.10 (Assessment of likely significant effects).

**Table 8.7: Summary of key stakeholder engagement meetings with Natural England**

#	Date of meeting	Location	Key comments	Where addressed within the ES
M001	06.06.18	Natural England Nottingham office	Provided NE with a clear understanding of the Scheme and project timescales. Obtained general agreement on the scope of ecology survey work for 2018. Aimed to confirm no obvious impact pathways to European Designated Sites and on that basis, impacts on European Designated Sites may be scoped out from further assessment. However, NE formally confirmed this following their review of the Habitat Regulations Assessment Report – No Significant Effects Report (via letter dated 13.12.18; see Appendix 8.2: Habitat Regulations Assessment - No Significant Effects Report Appendix E [TR010022/APP/6.3]). Determined the approach and timescales for draft protected species licences/obtaining Letters of No Impediment to support the ES. Confirmed the date and age of data to support the licences and which species need to be covered by the Letters of No Impediment. Top up bat surveys were advised to support the draft licences; and requirement to refer to bat hibernation potential across the Scheme in baseline information.	Refer to Section 8.3 (Assessment methodology); Section 8.5 (Assessment assumptions and limitations); Section 8.9 (Design, mitigation and enhancement measures); Section 8.10 Assessment of likely significant effects); Appendix 8.2 (Habitat Regulations Assessment – No Significant Effects Report) and Appendix 8.19 (Letter of No Impediment) [TR010022/APP/6.3].

#	Date of meeting	Location	Key comments	Where addressed within the ES
			Where access may have restricted gathering baseline data, an approach was agreed to draw conclusions to support the ES. The approach for Queensway buildings and survey approach for bats was agreed. It was agreed that baseline habitat information from review of aerial photography or onsite surveys should be conducted for the areas remote from the main Scheme works where works would comprise signage works within the existing highway verges, and associated road restraint systems (such areas would be subject to pre-construction survey and checks).	

**Table 8.8: Summary of statutory consultation comments on the PEIR**

Statutory consultee	Date	Comment	Where addressed within the ES
Environment Agency	05.10.18	We have reviewed Section 8 Biodiversity of the PEIR. Additional ecology surveys are programmed for 2018. The results of these will be presented in the ES. The EA would like to see a copy of this once it is complete.	Survey results are reported herein, with survey reports being provided as detailed in Table 8.2.
		Sections 8 (Biodiversity), 9 (Geology and Soils) and 13 (Road Drainage and the Water Environment) of the PEIR have been reviewed. The risks to the aquatic environment and potential mitigation measures have been adequately assessed.  However, there is one section that requires further investigation – 8.7.5, page 95, “Appropriate road treatments would be in place to minimise impacts from salt spray e.g. calcium magnesium acetate which is a low corrosion, and more environmentally sensitive alternative to road salt.” Whilst calcium magnesium acetate avoids the issues road salt can cause, due to the material's high Biochemical Oxygen Demand (BOD) it can cause bacterial growths (“sewage fungus”) and oxygen depletion if it enters surface waters. The impact of the potential use of this de-icing material therefore requires further assessment.	Discussions with East Midlands Asset Delivery team (Highways England) indicates that the de-icing agents used on the network are sodium chloride (NaCl) and sodium chloride brine. There is no proposal to replace these de-icing agents with calcium magnesium acetate. The use of de-icing agents is standard highway maintenance practice. As such, the assessment herein focuses upon operation effects associated with salt. Refer to Section 8.9 (Design, mitigation and enhancement measures); and Section 8.10 (Assessment of likely significant effects – Operation).

Statutory consultee	Date	Comment	Where addressed within the ES
Natural England	18.10.18	All mitigation measures should ensure no significant impacts.	Refer to Section 8.10 (Assessment of likely significant effects).
		NE are in on-going dialogue on protected species. The PEIR states that further data is still being collated on traffic modelling and potential air quality impacts on designated sites. NE encourages early engagement should additional surveys indicate significant impact to determine suitable mitigation measures if required.	Refer to Section 8.10 (Assessment of likely significant effects).
		NE supports the measures to ensure no net loss of biodiversity, we recommend that this can be strengthened to also consider how the proposal can incorporate ecological net gains. There may also be opportunities to enhance local sites and improve their connectivity.	Refer to Section 8.9 (Design, mitigation and enhancement measures); Section 8.10 (Assessment of likely significant effects).
		NE recommends how any environmental screening measures can provide wider environmental Green Infrastructure benefits, creating ecological corridors where possible. Consideration should be made to what existing environmental features on and around the site can be retained or enhanced or what new features could be incorporated into the development proposal. Opportunities for enhancement might include: <ul style="list-style-type: none"> <li>Restoring a neglected hedgerow.</li> <li>Planting trees characteristic to the local area to make a positive contribution to the local landscape.</li> <li>Using native plants in landscaping schemes for better nectar and seed sources for bees and birds.</li> </ul>	Refer to Section 8.9 (Design, mitigation and enhancement measures).
DCiC	16.10.18	Some trees and open space will be lost along the edge of Markeaton Park due to widening of the carriageway, replacement of existing services and the formation of the underpass. This is likely to open up views into the park and create an open aspect along this stretch of road, due to the loss of mature trees that currently line the road on the park side. This will have a negative impact on the park in the short to medium term through the loss of screening but it is proposed to mitigate this impact through improvement works to the wider park including new tree planting and habitat improvements to Markeaton Lake/Mill Ponds.	Refer to Section 8.9 (Design, mitigation and enhancement measures); and the landscape design drawings (refer to Figures 7.8a to 7.8c [TR010022/APP/6.2]).
		As part of the mitigation measures at Kingsway junction, two new ponds are to be provided within Mackworth Park with associated wildlife habitat improvements.	Not applicable. Refer to Section 8.9 (Design, mitigation and enhancement measures).

Statutory consultee	Date	Comment	Where addressed within the ES
Woodland Trust	11.10.18	<p>The Woodland Trust holds concerns with regard to the potential impact of the Little Eaton Junction improvements on a veteran oak (grid reference: SK36483978) within close proximity to the surface water management ponds.</p> <p>The Trust is unable to determine from the maps provided if the veteran oak will be affected, but we ask that the tree is provided with a full root protection area in order to protect it from the impacts of the scheme.</p> <p>The Trust notes that the PEIR states that “<i>Any veteran trees that may be felled would be used to provide dead wood habitats for saproxylic (dead wood loving) species.</i>” It is essential that no ancient nor veteran trees are lost to facilitate this Scheme, and every effort is taken to ensure that any veteran trees set to be impacted are retained with a full root protection area in line with Natural England’s Standing Advice.</p> <p>Veteran trees are protected under the National Planning Policy Framework paragraph 175c, which states: “<i>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</i>”.</p>	<p>The veteran oak (grid reference: SK36483978) would be retained by the Scheme.</p> <p>Refer to Section 8.3 (Assessment methodology); Section 8.7 (Baseline conditions); Section 8.9 (Design, mitigation and enhancement measures); and Section 8.10 (Assessment of likely significant effects – Habitats).</p>
Butterfly Conservation	18.09.18	<p>Consider potential for planting disease-resistant elms as part of the landscape design. There are colonies of White-letter hairstreak in Allestree, close to the University on Kedleston Road, Mickleover, Breadsall Cutting, Broomfield Hall, Markeaton Park, and at Mackworth Castle. Planting of Disease Resistant Elms in the vicinity of the proposed works would be beneficial and hopefully ensures the survival of this rare butterfly which has declined by 96% in the UK over the last 40 years.</p>	<p>Refer to Section 8.9 (Design, mitigation and enhancement measures – Terrestrial invertebrates; and landscape design drawings (refer to Figures 7.8a to 7.8c [TR010022/APP/6.2]).</p>

## 8.5 Assessment assumptions and limitations

- 8.5.1 The information presented in this chapter reflects that obtained and evaluated at the time of reporting.
- 8.5.2 This assessment is based upon the Scheme design and details regarding Scheme construction and operation as provided in Chapter 2: The Scheme and associated land take requirements.
- 8.5.3 The absence of desk study records for a species has not been taken to indicate species absence. Desk study records have been used alongside habitat data and the known or anticipated species distributions to infer whether these species may be present. The desk study has been used to inform the field survey scope and has been subsequently updated by the field surveys as necessary.
- 8.5.4 Field survey limitations are stated within the individual survey reports provided in Appendices 8.3 - 8.15 [TR010022/APP/6.3].
- 8.5.5 All non-statutory designated sites and non-designated sites of ecological interest within 2km of the Scheme boundary were initially scoped into the assessment. Further scoping of the sites was then undertaken as part of the baseline exercise for the assessment to identify those with potential to be either directly or indirectly impacted by the Scheme (refer to Section 8.7).
- 8.5.6 The biodiversity importance assigned to ecological features potentially affected by the Scheme reflects their known or potential status and distribution within the defined study area at the time of reporting (as described in Section 8.3).
- 8.5.7 As detailed in Chapter 2: the Scheme, para. 2.5.16, the Scheme would require the demolition of 15 detached residential properties on Queensway and the demolition of two semi-detached properties on the A52 Ashbourne Road. Bat roost surveys at properties due for demolition have been undertaken where possible. However, surveys were not possible in 2018 at No 4, 12, 14 and 16 on Queensway and No 259 Ashbourne Road. As such, these properties would be subject to pre-construction surveys (refer to Section 8.9). Should any bats be recorded using these buildings during pre-construction surveys, the draft European Protected Species Mitigation Licence (EPSML) for buildings within the Scheme (where a bat roost is confirmed at No 30 Queensway) would be amended to include any additional roosts. This is not considered a significant limitation, as multiple surveys have been undertaken near these buildings during 2017, including at neighbouring properties, and bat activity associated with any significant roosts would have been recorded had they been present. It is considered a low possibility that these buildings could support low conservation status roosts (small roosts of common species) and that roosts of higher conservation value (maternity roosts or roosts of rarer species) are unlikely to be present (refer to Table 8.4 NE meeting M001 on 06.06.18).
- 8.5.8 As detailed in Section 8.9, as mitigation for the loss of the A38 Roundabout LWS, it is proposed to translocate top soil collected from within the A38 Roundabout LWS to create new species-rich grassland area within Markeaton Park. It is assumed that the translocation works would have no significant adverse (neutral) effects on biodiversity during the construction phase through appropriate timing and planning of the translocation works (including definition of access routes) in coordination with DCiC. The receptor site within Markeaton Park (within the

Scheme boundary) currently comprises regularly managed (mown) amenity grassland of low biodiversity value. If during the detailed design stage translocation is not deemed suitable (for example, following detailed analysis of soil testing of the receptor site), then planting of a bespoke native seed mix would be undertaken instead to achieve the same ecological outcome.

8.5.9 As detailed in Table 8.13, following further surveys in late summer 2018 it is assumed that water vole detected in Dam Brook during surveys undertaken in spring 2018 are no longer present. As such, water voles have been scoped out of the impact assessment. Nevertheless, pre-construction surveys would be undertaken, and given the risks that water vole have on the Scheme construction programme (refer to Chapter 2: the Scheme, para. 2.6.7), a precautionary mitigation strategy has been put in place should water vole be detected during pre-construction surveys – refer to Section 8.9.

8.5.10 Highways England is investigating the feasibility of two Designated Fund<sup>13</sup> projects near the Scheme that relate to biodiversity, namely: i) the feasibility of a green bridge structure at Markeaton junction rather than the 'like-for-like' Markeaton footbridge replacement as described in Chapter 2: the Scheme, para. 2.5.12; ii) biodiversity enhancement works within areas of open space located adjacent to the Scheme (i.e. Markeaton Park and Mill Ponds, Ford Lane Site of Interest noting that these areas have been identified through stakeholder engagement). Such feasibility studies are being undertaken separately to the ES and are not covered by the DCO application. Thus, these biodiversity opportunities are mentioned herein as aspirational enhancement measures, however, any potential biodiversity impacts and benefits associated with these studies have not been factored into determining residual biodiversity effects of the Scheme.

## 8.6 Study area

8.6.1 The biodiversity study area has been defined by determining a 'zone of influence' (Zoi), encompassing the distance over which relevant ecological features could experience potential significant biodiversity effects due to the Scheme (construction and operation). This informed the area for baseline data collection. The distance extends beyond the Scheme boundary, for example where there are ecological or hydrological links that extend beyond the Scheme boundary. Defining the study area is an iterative process and the extent varies depending on the ecological feature concerned.

8.6.2 The following summarises the biodiversity study areas that have been used (with more detail provided in Appendix 8.1 [TR010022/APP/6.3]) and illustrated on Figure 8.1 and Figure 8.2 [TR010022/APP/6.2]. These areas include land within the Scheme boundary plus:

- Desk study area:
  - Up to 30km from the Scheme boundary for sites designated at an international level for bats or where potential impact pathways (hydrological or habitat links) are present for birds.

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<sup>13</sup> In the Road Investment Strategy, Highways England were given funding to improve the surroundings of the Strategic Road Network in a way that supports and protects people and the things we value for quality of life, both now and in the future.

- Up to 2km from the Scheme boundary for all other statutory and non-statutory designated sites and non-designated sites of interest.
- Up to 2km from the Scheme boundary for protected and notable habitats and species.
- Up to 2km for watercourses.
- Up to 500m for ponds.

(Note: air quality modelling has indicated that most of the nitrogen oxides (NOx) which have the potential to affect the composition of vegetation typically occurs within 200m of a highway. For impacts upon watercourses, sites located downstream are considered to be the most vulnerable to impacts).

- Field survey areas:
  - Up to 50m from the Scheme boundary for notable Phase 1 habitats.
  - Up to 500m from the Scheme boundary for great crested newts.
  - Up to 50m from the Scheme boundary for reptiles.
  - Up to 50m from the Scheme boundary for badger (extended up to 500m from the Scheme boundary (where access allowed) to check those badger sett records identified from the desk study data search).
  - Up to 250m from the Scheme boundary for water vole and otter.
  - Up to 50m from the Scheme boundary for bat roosts and notable foraging and commuting habitat.
  - Up to 500m from the Scheme boundary for breeding birds (although habitats within 50m of the Scheme are given greater emphasis).
  - Wet grassland habitat to the south-west of Little Eaton junction only for wintering birds.
  - At least 50m from the Scheme boundary for white-clawed crayfish (this study area was extended further where necessary to account for the requirement for a 100 – 200 m sampling site within a 500m section of any particular watercourse).
  - Up to 50m from the Scheme boundary for terrestrial invertebrates.
  - Up to 250m from the Scheme boundary for aquatic invertebrates.
  - Up to 100m from the Scheme boundary for fish (focusing on Dam Brook at Little Eaton junction which would be directly impacted by the Scheme).

8.6.3 All non-statutory designated sites and non-designated sites of ecological interest within 2km of the Scheme boundary were initially scoped into the assessment. Further scoping of these sites was then undertaken as part of the baseline exercise for the assessment (see Section 8.7) to identify those sites with potential to be either directly or indirectly impacted by the Scheme. Sites were then scoped in or out in terms of requiring further assessment, as based upon the following factors:

- Distance between the site and the Scheme (>200m in terms of potential air quality or noise effects on biodiversity<sup>14</sup>).
- Designated features, including specific habitat types or species present.
- Absence of any apparent possible ecological connectivity or linkages e.g. connecting watercourse or hydrology, or movement of species between the designated or non-designated sites and the Scheme.
- Or a combination of the above.

8.6.4 Those scoped into the assessment were primarily those sites:

- Within or immediately adjacent to the Scheme boundary plus 50m buffer where direct disturbance or edge effects were possible.
- Located up to 200m from the Scheme boundary where it was considered there was potential for indirect effects (for example through construction disturbance such as dust or noise).
- Located up to 2km downstream, with hydrological links between the designated or non-designated sites and the Scheme where there is a potential for indirect water pollution effects.
- With habitat connectivity facilitating movement of species between the designated or non-designated sites and the Scheme, and where potential habitat severance may occur.
- Or a combination of the above.

## 8.7 Baseline conditions

### Nature conservation designations

8.7.1 The desk-based study has confirmed that (refer to Figures 8.3 to 8.5 [TR010022/APP/6.2]):

- There are no European designated sites located within 2km of the Scheme.
- There are six European designated sites within 30km of the Scheme, namely: Gang Mine SAC, Bees Nest and Green Clay Pits SAC, Peak District SAC, South Pennine Moors SAC and SPA, River Mease SAC; and West Midlands Mosses SAC and Ramsar. However, none of these sites have bats as a qualifying feature; and there are no impact pathways (i.e. habitat or hydrological links) linking flight paths or feeding areas of birds from the Scheme to the SPA/Ramsar. Refer to Appendix 8.2: Habitat Regulations Assessment – No Significant Effects Report for details [TR010022/APP/6.3].
- There are no national or local statutory designated sites located within or directly adjacent to the Scheme.

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<sup>14</sup> All non-statutory sites located >200m from the Scheme boundary were scoped out in terms of potential effects from air quality and noise. Bignal et al (2004) concluded that buffer zones provide physical distance (rather than remove pollutants from the atmosphere). Bignal et al (2008) stated that roads should avoid a buffer zone of 100 – 200 m from sensitive sites (Natural England, 2016). Located > 200m from the Scheme boundary as per Volume 11 Environmental Assessment; Section 3 Environmental Assessment Techniques; Part 1 HA 207/07 Air Quality (DMRB, 2007). DMRB (2001) states that measures to reduce the effect of noise pollution should be applied next to wildlife sites (where appropriate).



- There is one national statutory designated site (namely Kedleston Park SSSI) and two local statutory designated sites (Mickleover Meadows LNR, Darley and Nutwood LNR) within 2km of Kingsway and Markeaton junctions; and two national statutory designated sites (Breadsall Railway Cutting SSSI and Morley Brick Pits SSSI) and four local statutory designated sites (Allestree Park LNR, Darley and Nutwood LNR, Breadsall Railway Cutting LNR and Chaddesden Woods and Lime Lane Wood LNR) within 2km of Little Eaton junction.
- There are five non-statutory designated sites (A38 Roundabout Local Wildlife Site (LWS), Bramble Brook and Margins LWS, Markeaton Park LWS, Markeaton Brook System LWS and Mickleover Railway Cutting LWS) located within or directly adjacent to the Scheme boundary at Kingsway and Markeaton junctions. There are 16 other LWSs located within 2km of the Scheme boundary at Kingsway and Markeaton junctions.
- There are two LWSs located within or directly adjacent to the Scheme at Little Eaton junction (Alfreton Road Rough Grassland LWS and River Derwent LWS). There are 32 other LWSs located within 2km of the Scheme boundary at Little Eaton junction.
- There is one non-designated site, PLWS or site of interest reported by DWT adjacent to the Scheme boundary at Markeaton junction (Broadway Stream DE056/3). There are 15 other non-designated sites located within 2km of the Scheme boundary at Kingsway and Markeaton junctions.
- There are six non-designated sites located within or directly adjacent to the Scheme boundary at Little Eaton junction (A38 Scrub, Ford Lane Field, Des Lane Brook Course, Boosemoor Brook, Plantation and Old Derby Canal). There are 26 other non-designated sites located within 2km of Little Eaton junction.

8.7.2 Appendix 8.17 [TR010022/APP/6.3] presents details of the statutory, non-statutory and non-designated sites located within 2km of the Scheme boundary, and whether they are scoped in or out of the ecology impact assessment (taking into account the factors as detailed in Section 8.6). These sites are also shown on Figures 8.3 to 8.5 [TR010022/APP/6.2]. Those sites scoped into the assessment, together with the applicable rationale, are detailed in Table 8.9 and Table 8.10.

**Table 8.9: Summary of designated and non-designated sites scoped into the assessment – Kingsway and Markeaton junctions**

Site name	Designation(s)	Reason for designation	Relationship to Scheme	Rationale for scoping in
<b>Statutory designated sites</b>				
Kedleston Park	SSSI	Rich and diverse deadwood invertebrate fauna which is primarily dependent upon the large number of mature and over-mature beech and pedunculate oak trees.	Approximately 1.9km north-west of the Scheme boundary (Markeaton junction).	Statutory designated site and proximity to the Scheme.
Mickleover Meadows	LNR	Diverse habitat mosaic.	0.7km west of the Scheme boundary (Kingsway junction).	Statutory designated site and proximity to the Scheme.
Darley and Nutwood	LNR	Habitats include grassland being invaded by scrub and woodland which includes an area of ancient woodland.	1.5km north-east of the Scheme boundary (Markeaton junction).	Statutory designated site and proximity to the Scheme.
<b>Non-statutory designated sites</b>				
A38 Roundabout	LWS	Semi-improved neutral grassland.	Within the Scheme boundary.	Within the Scheme boundary.
Mickleover Railway Cutting	LWS	Habitat mosaic.	Adjacent to the Scheme boundary continuing up to 0.8km west of the Scheme boundary.	Proximity to the Scheme.
Markeaton Brook system	LWS	Invertebrate assemblage (including white-clawed crayfish).	Within the Scheme boundary continuing up to 0.8km south-east of the Scheme boundary and 1.2km north of the Scheme boundary.	Proximity to the Scheme.
Bramble Brook and margins	LWS	Secondary broad-leaved woodland.	Adjacent to and within the Scheme boundary.	Proximity to the Scheme.
Markeaton Park	LWS	Wood pasture and Parks including veteran trees (BAP habitat – Wood pasture).	Directly adjacent to the north and west of the Scheme boundary.	Proximity to the Scheme.

Site name	Designation(s)	Reason for designation	Relationship to Scheme	Rationale for scoping in
<b>Non-designated sites of interest</b>				
Land off Kingsway	PLWS (DE115 and (R6541)	Running water and small pond.	Approximately 0.2km east of the Scheme boundary.	Within 200m of the Scheme. Nitrogen oxides (NOx) have the potential to affect the composition of vegetation to occur within 200m of the highway. Hydrological links downstream of the Scheme.

**Table 8.10: Summary of designated and non-designated sites scoped into the assessment – Little Eaton junction**

Site name	Designation(s)	Reason for designation	Relationship to Scheme	Rationale for scoping in
<b>Statutory designated sites</b>				
Breadsall Railway Cutting	LNR, SSSI	Unimproved grassland. Calcareous, neutral and acidic grassland. Diverse butterfly population.	Approximately 1.5km south-east of the Scheme boundary.	Statutory designated site and proximity to the Scheme.
Allestree Park	LNR	Parkland, veteran trees, secondary woodland and open water.	Approximately 0.2km west of the Scheme boundary at the proposed road sign locations; approximately 1km to the west of the main Scheme footprint.	Statutory designated site and proximity to the Scheme.
Darley and Nutwood	LNR	Habitats include grassland being invaded by scrub and woodland which includes an area of ancient woodland.	Approximately 0.4km south of the Scheme boundary.	Statutory designated site and proximity to the Scheme.
Chaddesden Wood and Lime Lane Wood	LNR	Ancient semi-natural oak woodland.	Approximately 1.6km east of the Scheme boundary.	Statutory designated site and proximity to the Scheme.
<b>Non-statutory designated sites</b>				
Alfreton Road Rough Grassland	LWS	Floodplain grassland semi-improved.	Within the Scheme boundary.	Within Scheme boundary.
River Derwent	LWS	Flowing water, river and associated streams.	Within the Scheme boundary.	Within the Scheme boundary.

Site name	Designation(s)	Reason for designation	Relationship to Scheme	Rationale for scoping in
Allestree Park	LWS	Unimproved neutral grassland (BAP habitat – Wood pasture)	Approximately 0.2km west of the Scheme boundary at the proposed road sign locations; Approximately 1km to the west of the main Scheme footprint.	Overlaps with statutory designated site Allestree Park LNR.
Nutwood and Darley Abbey Wildlife Site LWS	LWS	Neutral grassland and ancient woodland.	Approximately 0.5km south of the Scheme boundary.	Overlaps with statutory designated site Darley and Nutwood LNR.
Watermeadows Ditch	LWS	Standing open water.	Approximately 0.4km south of the Scheme boundary.	Hydrological links to the Scheme via Watermeadows ditch downstream.
Nooney's Pond	LWS	Standing open water.	Approximately 0.7km south of the Scheme boundary.	Hydrological links via Watermeadows Ditch downstream of the Scheme.
Darley Park	LWS	Wood Pasture and Parkland (BAP habitat – Wood pasture)	Approximately 1.2km south of the Scheme boundary.	Habitat and hydrological connectivity via the River Derwent downstream of the Scheme.
Chaddesden Wood and Lime Lane Wood	LWS	Ancient semi-natural oak woodland (BAP habitat – Traditional orchard)	Approximately 1.6km east of the Scheme boundary.	Overlaps with statutory designated site Chaddesden Wood and Lime Lane Wood LNR.
<b>Non-designated sites of interest</b>				
A38 Scrub	DE050/3	Not assessed.	Within the Scheme boundary.	Within the Scheme boundary.
Ford Lane Field	Site recorded as a PLWS in 2015 by DWT but not in 2016. AV Grassland (no designation number)	Semi-improved acid grassland needs survey.	Within the Scheme boundary.	Within the Scheme boundary.
Des Lane Brook Course	DE/3	Not assessed.	To the west of the Scheme boundary.	Proximity to the Scheme.
Boosemoor Brook	ER018/3	Not assessed.	Adjacent to the east of the Scheme boundary.	Proximity to the Scheme.

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Site name	Designation(s)	Reason for designation	Relationship to Scheme	Rationale for scoping in
Plantation	ER017/3	Not assessed.	Adjacent to the north of the Scheme boundary.	Proximity to the Scheme.
Old Derby Canal	ER003/3	Not assessed.	Adjacent to the south of the Scheme boundary.	Proximity to the Scheme.
Marsh area, Breadsall	PLWS ER001	Swamp	Approximately 0.2km south of the Scheme boundary.	Proximity to the Scheme; hydrological links with Watermeadows Ditch downstream of the Scheme.
Holme Nook Ponds	PLWS DE R6440	Open water	Approximately within 0.25km south of the Scheme boundary.	Habitat and hydrological links via the River Derwent; downstream of the Scheme.
Haslams Lane Brook course	Haslams	No information	Approximately 1.5km south of the Scheme boundary.	Hydrological links via River Derwent and Watermeadows Ditch; located downstream of the Scheme.

## Habitats

8.7.3 Habitats identified during the Extended Phase 1 Habitat Surveys (Appendix 8.3(a) and 8.3 (b) [TR010022/APP/6.3]) as being present within the study area are summarised below. Refer to Figures 8.6 to Figure 8.8 [TR010022/APP/6.2], and detailed descriptions and target notes provided in Appendix 8.18 [TR010022/APP/6.3]:

- Semi-natural broad-leaved woodland (LBAP Habitat; Lowland Mixed Deciduous Woodland - Habitat of principal importance; Highways Agency BAP Habitat 2002).
- Broad-leaved plantation woodland (Highways Agency BAP habitat 2002).
- Coniferous plantation woodland (Highways Agency BAP habitat 2002).
- Mixed plantation woodland (Highways Agency BAP habitat 2002).
- Dense and scattered scrub.
- Scattered broad-leaved trees including veteran trees (veteran trees - LBAP habitat; habitat of principal importance – wood pasture and parkland).
- Scattered mixed trees.
- Semi-improved neutral grassland (LBAP habitat; Highways Agency BAP habitat 2002).
- Poor semi-improved grassland (LBAP habitat; Highways Agency BAP habitat 2002).
- Marshy grassland (Highways Agency BAP habitat 2002).
- Improved grassland and arable.
- Tall ruderal including invasive non-native plant species (Schedule 9 of the Wildlife and Countryside Act (WCA) 1981 as amended).
- Standing water and associated inundation vegetation (LBAP habitat; lakes and ponds of certain criteria - habitat of principal importance; Highways Agency BAP habitat 2002) – notably Markeaton Lake, Mill Pond 1 and Mill Pond 2 (some located within the Scheme boundary at Markeaton junction); and the waterbody at Pb5 (located within the Scheme boundary at Little Eaton junction), and Alfreton Grasslands LWS Pb9 (located within 50m of the Scheme boundary at Little Eaton junction).
- Running water (LBAP habitat; rivers of certain criteria - habitat of principal importance; Highways Agency BAP habitat 2002) – notably Bramble Brook (located within the Scheme boundary at Kingsway junction); Middle Brook and Markeaton Brook (located on and within 50m the Scheme boundary at Markeaton junction); the River Derwent, Dam Brook, Watermeadows Ditch, and Boosemoor Brook (located on or within 50m of the Scheme boundary).
- Amenity grassland.
- Hard standing, bare ground and rocks.
- Buildings.

- Hedgerows.
  - Introduced shrubs.
- 8.7.4 Further botanical surveys were conducted between 2015 and 2018 of areas of semi-improved grassland, scrub, woodland, standing and running water, and hedgerows within and adjacent to the Scheme boundary. Refer to Figure 8.9 and 8.10 [TR010022/APP/6.2] for a summary of the botanical baseline information; and Appendix 8.4(a), 8.4(b) and 8.4(c) [TR010022/APP/6.3] for further details.
- 8.7.5 Of the 12 areas of semi-improved grassland surveyed, three areas of species-rich grassland were confirmed in 2018 based on the number of grassland indicator species listed in the DWT grassland criteria (DWT, 2011) to qualify for LWS status, namely:
- Area 1B: located within the A38 Kingsway Roundabout LWS southern island at Kingsway junction.
  - Area 2K: an area of unmanaged species-rich grassland sward, which occur on a steep slope local to the sewage works adjacent to the A38 at Little Eaton junction.
  - Area 2Q: disturbed area of grassland established on a former landfill site to the north of Little Eaton junction.
- 8.7.6 The other nine areas were surveyed between 2015 and 2018 and assessed to be species-poor and included:
- Area 1A, 1C, 1K, 1L: Kingsway hospital grasslands at Kingsway junction.
  - Area 1D: located within the A38 Kingsway Roundabout LWS northern island at Kingsway junction.
  - Area 1I: unmanaged neutral grassland on the southern-eastern corner of Kingsway junction.
  - Area 1E: managed grassland within the Army Reserves Centre site at Markeaton junction.
  - Area 1F: at Markeaton junction (although it is noted that this habitat was only one indicator species short of requirements for potential consideration of an LWS during the 2018 botanical survey).
  - Area 2E: horse grazed field within Alfreton Road Rough Grassland LWS at Little Eaton junction.
- 8.7.7 One area of scrub (Area 1H) was surveyed within the A38 Kingsway Roundabout in 2015 and 2018; and noted to be encroaching on the area of species-rich semi-improved grassland (Area 1B).
- 8.7.8 Four areas of woodland were surveyed between 2015 and 2017. None of these were found to have any characteristic woodland flora or notable botanical interest. These areas were:
- Area 1G: an area of broadleaved plantation woodland within the A38 Kingsway Roundabout LWS south of Kingsway junction roundabout.
  - Area 1J: an area of broadleaved plantation woodland within the A38 Kingsway Roundabout LWS north of Kingsway junction roundabout.

- Area 2I: an area of broadleaved plantation woodland at Little Eaton junction.
- Area W1: an area of broadleaved pasture woodland which forms the A38 Scrub Other Site of Interest (non-designated site).

8.7.9 One seasonal wetland ‘standing water’ within the Alfreton Road Grassland LWS (Area 2F) was subject to botanical surveys in 2015 and 2018. The results in 2018 were comparable to those undertaken in 2015 and found to have five indicator species based on the open water and drawdown criteria taken from DWT (DWT, 2011) and assessed as species-rich.

8.7.10 A total of 26 hedgerows were identified between 2015 and 2018 within the Scheme boundary plus 50m. Twenty-two hedgerows (H1 to H7, H9 to H16, H25 and H31 to H36) were recorded as intact species-poor; two hedgerows (H26 and H30) were recorded as defunct species-poor hedgerows; and H37 and H38 were recorded as species-poor hedgerows with trees. All the hedgerows were assessed as ‘not important’ under the nature conservation criterion of the Hedgerow Regulations 1997.

8.7.11 The River Habitat Survey in 2018 was conducted on Bramble Brook, Dam Brook and Middle Brook (modified channels), and Mickleover Railway Cutting LWS (an artificial channel). The River Habitat Survey in 2015 also included Markeaton Brook and the River Derwent (both modified channels). All watercourses demonstrated some degree of recovery from a heavily modified state to a more naturalised morphology through the action of hydromorphological processes such as erosion and deposition, but were still limited through historic modification, and continued impacts including siltation, water quality inputs and urban trash. The watercourses surveyed as part of the botanical survey in 2018 included Bramble Brook at Kingsway junction, and Dam Brook at Little Eaton junction to identify aquatic macrophyte and ditch bank species. Notable flora species were not recorded in either watercourse.

8.7.12 Five ancient woodlands were identified within 2km of the Scheme boundary from the desk study. Ancient woodland results are summarised in Table 8.11 and shown on Figure 8.5 [TR010022/APP/6.2]. These habitats are assessed as part of the designated and non-designated sites scoped into the assessment where applicable (see Table 8.9 and 8.10).

**Table 8.11: Ancient woodland recorded within the Scheme study area**

Site name	Designation(s)	Reason for designation	Relationship to Scheme
Darley and Nutwood	LNR and LWS	Habitats include grassland being invaded by scrub and woodland which includes an area of ancient woodland.	Approximately 0.4km south of the Scheme boundary (Little Eaton junction).
Horsley Carr	LWS	Ancient woodland plantation-mixed.	Approximately 0.6km east of the northernmost proposed road sign location (Little Eaton junction).
Burley Wood	LWS	Ancient-woodland plantation-broadleaved.	Approximately 1.5km west of the Scheme boundary (Little Eaton junction).



Site name	Designation(s)	Reason for designation	Relationship to Scheme
Chaddesden Wood and Lime Lane Wood	LNR and LWS	Ancient semi-natural oak woodland. (BAP habitat – Traditional orchard)	Approximately 1.6km east of the Scheme boundary (Little Eaton junction).
Great Farley's Wood	LWS	Ancient semi-natural woodland-mixed. (BAP habitat – Traditional orchard)	Approximately 1.75km west of the northernmost proposed road sign location (Little Eaton junction).

8.7.13 Table 8.11 indicates that there are no ancient woodlands within the Scheme boundary.

8.7.14 Records of veteran trees were obtained from desk study information and from arboriculture surveys conducted across the Scheme in 2018 (refer to Appendix 7.2 [TR010022/APP/6.3]). Veteran tree results within 50m of the Scheme boundary are summarised in Table 8.12 and shown on Figures 8.9 and 8.10 [TR010022/APP/6.2].

**Table 8.12: Veteran trees recorded within and adjacent to the Scheme boundary from desk study and arboricultural surveys**

Tree Ref.	Description	Location	Source of Information	Shown on Figure [TR010022/APP/6.2]	Notes
DWT1*(T12**)	Hawthorn	Adjacent to the Scheme boundary within Markeaton Park.	DWT and Appendix 7.2 [TR010022/APP/6.3]	DWT1 shown on Figure 8.9	-
DWT14*(T4**)	Cherry <i>Prunus</i> sp.	Adjacent to the Scheme boundary within Markeaton Park.	DWT and Appendix 7.2 [TR010022/APP/6.3]	DWT14 shown on Figure 8.9	-
DWT26*(T287**)(M55***)	Common oak <i>Quercus robur</i>	Adjacent to the Scheme boundary within Markeaton Park.	DWT and Appendix 7.2 [TR010022/APP/6.3]	DWT26 shown on Figure 8.9	-
G305**	Beech <i>Fagus sylvatica</i> , Horse Chestnut <i>Aesculus hippocastanum</i> , Sycamore <i>Acer pseudoplatanus</i>	Adjacent to the Scheme boundary within Markeaton Park.	Appendix 7.2 [TR010022/APP/6.3]	G305 shown on Figure 8.9	-

Tree Ref.	Description	Location	Source of Information	Shown on Figure [TR010022/A PP/6.2]	Notes
DWT3* (part of G361**) (M2***)	Common oak	Located within the Scheme boundary on the eastern side of the A38, opposite Markeaton Park.	DWT and Appendix 7.2 [TR010022/A PP/6.3]	DWT3 shown on Figure 8.9	Arboricultural survey did not record this tree as veteran. Veteran tree DWT record not considered to be present at this location.
DWT2, DWT4 to DWT13 and DWT15 to 18*	Lime <i>Tilia</i> sp, Beech, Contorted willow <i>Salix babylonica</i> var. <i>pekinensis</i> 'Tortuosa', Oak, Cherry, Weeping Willow <i>Salix babylonica</i>	Adjacent or within the Scheme boundary within Markeaton Park, along Markeaton Lake.	DWT	DWT4 to DWT13 and DWT16 to 18 shown on Figure 8.9	-
M36*** (T358**)	Common oak	Located within the Scheme boundary on the eastern side of the A38, opposite Markeaton Park.	Appendix 7.2 [TR010022/A PP/6.3]	M36 shown on Figure 8.9	-
T31*** (T423**)	Common oak	Located within the Scheme boundary to the west of the River Derwent and south of the A38. Near the proposed floodplain compensation area at Little Eaton junction.	Appendix 7.2 [TR010022/A PP/6.3]	T31 shown on Figure 8.10	-
T30*** (T424**)	Common oak	Located within the Scheme boundary to the west of the River Derwent and south of the A38. Near the proposed floodplain compensation area at Little Eaton junction.	Appendix 7.2 [TR010022/A PP/6.3]	T30 shown on Figure 8.10	-
T29*** (T426**)	Common oak	Located within the Scheme boundary to the west of the River Derwent and south of the A38. In the vicinity of the proposed floodplain compensation area at Little Eaton junction.	Appendix 7.2 [TR010022/A PP/6.3]	T29 shown on Figure 8.10	-

Tree Ref.	Description	Location	Source of Information	Shown on Figure [TR010022/A PP/6.2]	Notes
DWT19* (T464*)	Common oak	Located within the Scheme boundary to the south-east of the roundabout at Little Eaton junction (within proposed soil storage area).	DWT and Appendix 7.2 [TR010022/A PP/6.3]	DWT19 shown on Figure 8.10	-
DWT20 and DWT24* (G451**)	Alder <i>Alnus glutinosa</i>	Located to the east of Alfreton Rough Grassland LWS at Little Eaton junction.	DWT	DWT20 and DWT24 shown on Figure 8.10	Arboricultural survey recorded this feature as semi-mature to mature elder and hawthorn with no veteran features or characteristics. Veteran tree DWT record not considered to be present at this location.
DWT21	Willow	Roadside beside A61, near Little Eaton junction (outside the Scheme boundary).	DWT	DWT21 shown on Figure 8.10	-
DWT22	Ash	Field between railway line and River Derwent (outside the Scheme boundary).	DWT	DWT22 shown on Figure 8.10	-
DWT23	Ash	Field between railway line and River Derwent (outside the Scheme boundary).	DWT	DWT23 shown on Figure 8.10	-
DWT25	Alder	Roadside beside A61, near Little Eaton junction (outside the Scheme boundary).	DWT	DWT25 shown on Figure 8.10	-

\*Derbyshire Wildlife Trust (DWT) Tree Reference Number

\*\*Bat Potential Roost Feature Assessment Tree Reference Number

\*\*\*Arboricultural Survey Tree Reference Number (refer to Appendix 7.2 [TR010022/APP/6.3])

8.7.15 The Scheme falls within National Character Area (NCA) profile '68 Needwood and South Derbyshire Claylands' at Kingsway and Markeaton junctions; and '50 Derbyshire Peak Fringe and Lower Derwent' at Little Eaton junction (refer to Chapter 7: Landscape and Visual Impact Assessment). Needwood and South Derbyshire Claylands NCA is predominantly noted for its woodlands (ancient woodland, wood pasture and parkland) and extensive hedges and pastoral

landscape dominated by mixed farming. The Derbyshire Peak Fringe and Lower Derwent NCA, is noted for its rivers to be of major importance, including the River Derwent and its tributaries. Priority habitats include lowland mixed deciduous woodland, wet woodland, grazing marsh, upland heath and lowland meadows.

### **Flora species**

#### ***Notable plant species***

- 8.7.16 Sand spurrey *Spergularia rubra* data records from DWT were located possibly within the Scheme boundary near Kingsway junction roundabout and at Little Eaton junction. Brown sedge *Carex disticha* data records were also possibly within the Scheme boundary near Kingsway junction. However, DWT record accuracy was not precise enough to determine the exact locations of these records (refer to Figures 8.9 and 8.10 [TR010022/APP/6.2]).
- 8.7.17 Neither these or other notable flora species were recorded on or within 50m of the Scheme boundary during the Extended Phase 1 habitat and botanical surveys, and which would require individual valuation or assessment.

#### ***Invasive plant species***

- 8.7.18 Schedule 9 of the WCA 1981 (as amended) covers the control of invasive plants and animals. Invasive plant species recorded within or adjacent to the Scheme boundary were as follows (refer to Figure 8.11 and 8.12 [TR010022/APP/6.2]):
- Japanese knotweed *Fallopia japonica*.
  - Giant knotweed *Fallopia sachalinensis*.
  - Himalayan balsam *Impatiens glandulifera*.
  - Variegated yellow archangel *Lamium galeobdolon subsp. Argentatum*.
  - New Zealand pigmyweed *Crassula helmsii*.
  - Cherry laurel *Prunus laurocerasus* and snowberry *Symphoricarpos albus* (although not listed on Schedule 9 species, these species are listed on the Great Britain Invasive Non-Native Species Secretariat).

### **Fauna species**

- 8.7.19 A summary of baseline information of fauna species recorded in the study area is presented in Table 8.13 and shown on Figures 8.13 to 8.36 [TR010022/APP/6.2]. For further survey details, refer to the baseline reports referenced in Table 8.13.

**Table 8.13: Summary of baseline details for legally protected and other notable fauna species**

Species	Desk study data 2018	Summary of most recent (≤2 years) and/or relevant field survey data	ES Figure reference [TR010022/APP/6.2]	Appendix* [TR010022/APP/6.3]	Scoped into or out of the assessment
Amphibians	Records of great crested newt found within 2km of the Scheme at Mickleover (approximately 1km west of Kingsway junction) and approximately 2km east of Little Eaton junction.  No records of common toad from desk study information.	No great crested newts were found in any of the ponds surveyed within 500m of the Scheme boundary. Great crested newts were confirmed at Mickleover as per desk study records; however, located >500m from Scheme. Population of toads found in ponds at Markeaton in 2015 (Pa6, Pa7 and Pa8) and assumed to still be present in 2017 during great crested newt surveys.	Figures 8.13 and 8.14	Appendix 8.6(a) and 8.6(b)	Great crested newts – scoped out  Toads – scoped in
Reptiles	Two recent records of grass snakes located 1km from Markeaton junction.  Records of slow worms located approximately 125m from the Road Sign Area 1 north of Little Eaton junction.	No reptiles were recorded across the Scheme during surveys in 2015.  No significant habitat changes were recorded during the Extended Phase 1 Habitat Survey in 2017 across the Scheme, of those areas of habitat previously surveyed for reptile in 2015. Given the negative result in 2015, no further surveys were recommended in 2017/18 on those areas previously surveyed.  New grassland habitats were identified with potential to support reptile populations in 2016/2017 due to Scheme boundary changes. No reptiles were found within the construction compound at Little Eaton junction (Site 8), proposed soil storage area (Site 10) and areas adjacent to the River Derwent (Site 19) during surveys in 2017/2018.  A small area of grassland with associated scrub with potential for slow worms was recorded adjacent to the road signage area 1 during the walkover survey with the East Midlands Asset Delivery team (Highways England) in 2018.	Figures 8.15 and 8.16	Appendix 8.7(a) and 8.7(b)	Scoped out  (However, refer to para. 8.3.29 which indicates that pre-construction surveys would be undertaken within areas of signage works within the existing highway verges to ensure impacts upon reptiles at Little Eaton junction would be avoided).
Breeding birds	Desk study records were returned for numerous bird species listed under Section 41 of the NERC Act (2006).	Surveys in 2015 and 2017 recorded: <ul style="list-style-type: none"> <li>No notable breeding bird assemblages at Kingsway and Markeaton junctions.</li> <li>An assemblage of notable farmland birds on the pastoral land and arable land to the east of the A38 at Little Eaton junction.</li> <li>A population of nesting lapwing using the flooded pasture south-west of Little Eaton junction.</li> <li>Presence of the Schedule 1 little ringed plover and oystercatcher south-west of Little Eaton junction.</li> <li>Breeding bird interest in association with scrub at the construction compound at Little Eaton junction.</li> <li>Common nesting bird species across the Scheme.</li> </ul> In 2015, Schedule 1 barn owl was recorded at Little Eaton junction. In 2017 no signs of active barn owl nesting were recorded. Updated surveys in 2018 confirmed no signs of barn owl nesting; however, barn owls were heard in the area during nocturnal surveys.	Figures 8.17, 8.18 and 8.19 CONFIDENTIAL	Appendix 8.8(a), 8.8(b) and 8.8(c)	Scoped in
Wintering birds	As above.	The breeding bird survey in 2015 indicated that the flooded field to the south-west of Little Eaton junction was suitable for wintering waterfowl and waders. Wintering bird surveys were subsequently conducted in 2015/16 and updated in 2017/2018. Populations of wintering birds including lapwing and teal, were identified to the south-west of Little Eaton junction during surveys in both 2015/16 and 2017/18. Population of black headed gull were also identified in 2017/18 surveys.	Figure 8.20	Appendix 8.8(d) and 8.8(e)	Scoped in
Bats – roosting	Around the Scheme boundary at Kingsway and Markeaton junctions, there are three records of known roosts situated within the Scheme boundary; these included a pipistrelle, <i>Pipistrellus</i> sp. (common or soprano pipistrelle) and an unidentified species roost. Up to 1km from the Scheme boundary there are eight common pipistrelles, two soprano pipistrelles, two Pipistrelle species and two brown long-eared known roosts; a further two common	<u>Buildings</u> Two bat roosts were confirmed in buildings during surveys carried out in 2017/18 across the Scheme plus 50m: <ul style="list-style-type: none"> <li>Queensway (QW) 30 within the Scheme boundary at Markeaton junction (building is proposed for demolition by the Scheme) - onw common pipistrelle recorded emerging in 2017, small number of whiskered droppings recorded during an internal inspection in February 2017. No bats recorded emerging or entering in 2018. The building was not considered suitable to support hibernating bats.</li> <li>B9 Ford Park Static Homes: Caravan N within 50m of the Scheme boundary at Little Eaton junction (presumed a small day Pipistrelle sp. roost as a single common pipistrelle record was brought back from the desk study for Caravan F from data and one bat dropping found at Caravan N during external daytime inspection).</li> </ul> Twelve buildings (proposed for demolition by the Scheme) located within the Scheme boundary at Markeaton junction were surveyed for bats in 2017/2018; however, no roosts were confirmed present: <ul style="list-style-type: none"> <li>B8-QW32 – assessed as high suitability to support roosting bats.</li> </ul>	Figures 8.21 and 8.22	Appendix 8.9(a), 8.9(b) 8.9(c), and 8.9(e)	Scoped in

Species	Desk study data 2018	Summary of most recent (≤2 years) and/or relevant field survey data	ES Figure reference [TR010022/APP/6.2]	Appendix* [TR010022/APP/6.3]	Scoped into or out of the assessment
	<p>pipistrelle roosts are situated between 1 – 2 km from the Scheme boundary.</p> <p>Around the Scheme boundary at Little Eaton junction, records of two bat roosts were provided; a common pipistrelle and brown long-eared roost respectively. Up to 1km from the Scheme boundary there are records of two common pipistrelles, one soprano pipistrelle, two Pipistrelle species and five brown long-eared roosts; a further three common, one Pipistrelle species and one unidentified species roosts are situated between 1 – 2 km from the Scheme boundary.</p>	<ul style="list-style-type: none"> <li>• B8-QW2, B8-QW8, B8-QW20 and B8-QW26 – assessed as Moderate suitability to support roosting bats.</li> <li>• B8-QW6, B8-QW10, B8-QW18, B8-QW22, B8-QW24B8-257 and B10 – assessed as Low suitability to support roosting bats.</li> <li>• B8-QW28 was assessed as negligible suitability to support roosting bats.</li> </ul> <p>None of these buildings were considered suitable to support hibernating bats.</p> <p>Queensway buildings B8-QW4, B8-QW12, B8-QW14, B8QW16 and B8-259 Ashbourne Road (proposed for demolition) located within the Scheme boundary were not subject to a full suite of bat surveys in 2017/18 due to access restrictions. Refer to Section 8.5 (Assessment assumptions and limitations) for details on the approach for the assessment. External assessments were undertaken at all properties and internal inspections undertaken at all but B8-QW16 and B8-259 Ashbourne Road; however, roost surveys were restricted at all five locations.</p> <ul style="list-style-type: none"> <li>• B8-QW4, B8-QW14, B8-QW16 – assessed as moderate suitability to support roosting bats.</li> <li>• B8-QW12, B8-259 – assessed as low suitability to support roosting bats.</li> </ul> <p>B7, an electricity sub-station near Markeaton junction, was surveyed for bats in 2015. B7 was assessed as moderate suitability to support roosting bats; however, no roost was confirmed present.</p> <p>The following buildings within 50m of the Scheme boundary were assessed during daytime inspections and scoped out for further surveys based on their distance from the Scheme boundary or assessed as negligible suitability:</p> <ul style="list-style-type: none"> <li>• B9(B), B9(ZA), B9(ZB) caravans at Ford Farm Mobile Home Park– assessed as moderate suitability.</li> <li>• B11b Derby Garden Centre; and B9(I), B9(E), B9(P), B9(Q) – assessed as low suitability.</li> <li>• B11a and B9 (A, C, D, G, H, J, K, L, M, O, R, S, T, U, V, W X, Y and Z) caravans at Ford Farm Mobile Home Park – assessed as negligible suitability.</li> </ul> <p><u>Structures</u></p> <p>Bat roosts at two bridges at Little Eaton junction were confirmed during bat surveys in 2015/17/18:</p> <ul style="list-style-type: none"> <li>• B2 Flood Arch within the Scheme boundary - feeding roost for brown long-eared recorded in 2015, small occasional day roosts for the pipistrelle species recorded in 2017 and feeding roost for common and soprano pipistrelle recorded in 2018. The third expansion joints were predominantly utilised on either side of the bridge in 2018. Features associated with roosting in 2017 were considered no longer present in 2018.</li> <li>• B3 River Derwent bridge adjacent to the Scheme boundary – established common pipistrelle maternity roost subject to regular Highways England monitoring. 2017 surveys suggested other bats (Daubenton's and Soprano pipistrelle) may also occasionally use the feature as a day roost.</li> </ul> <p>Bridge B1, which carries the existing A38 over a Midland Mainline railway line to the west of Little Eaton junction was assessed to have negligible suitability to support roosting bats in 2018. Similarly, the Ford Lane bridge over the River Derwent was assessed to have negligible suitability to support roosting bats in 2018.</p> <p>Three bridges at Kingsway and Markeaton junctions were surveyed for bats in 2015 and 2018; however, no roosts were confirmed present:</p> <ul style="list-style-type: none"> <li>• B4, B5 and B6 – all assessed as low suitability to support roosting bats.</li> </ul> <p>None of the bridges surveyed across the Scheme were considered to have potential to support hibernating bats.</p> <p>A potential roosting feature assessment was conducted of four airshafts associated with historic filter tunnels adjacent to the River Derwent (buried under groundwater level – refer to Chapter 13: Road Drainage and the Water Environment Section 13.7) within the Scheme boundary at Little Eaton junction in 2018. These were assessed to have negligible suitability to support roosting bats.</p> <p><u>Trees</u></p> <p>One bat roost was confirmed in trees during surveys in 2017/18 at Markeaton junction:</p> <ul style="list-style-type: none"> <li>• <b>M2</b> within the Scheme boundary – Noctule maternity roost with hibernation potential (while Noctule bats are unlikely to use the same feature all year this cannot be discounted).</li> </ul> <p>Twenty eight trees within the Scheme boundary plus 50m assessed as Moderate or High suitability to support roosting bats were subject to dusk emergence/dawn re-entry surveys in 2017/18; however, no roosts were confirmed:</p> <ul style="list-style-type: none"> <li>• <b>M36, M55, T1 and T69</b> – High suitability.</li> <li>• <b>M1, M3, M4, M6, M7, M9, M10, M14, M15, M17, M20, M23, M24, M28, M29, M32, M33, M34, M46, M51, M53, T2, T29 and T31</b> – Moderate suitability.</li> </ul> <p>Six trees were scoped out of further survey due to their location beyond the Scheme boundary, or in an area of habitat retained by the Scheme:</p>			

Species	Desk study data 2018	Summary of most recent (≤2 years) and/or relevant field survey data	ES Figure reference [TR010022/APP/6.2]	Appendix* [TR010022/APP/6.3]	Scoped into or out of the assessment
		<ul style="list-style-type: none"> <li>• <b>M37, M38, T71</b> and T77 – assessed as Moderate suitability.</li> <li>• <b>T21, T22</b> – not assessed.</li> </ul> <p>Two trees were scoped out of further survey due to no longer being present:</p> <ul style="list-style-type: none"> <li>• T28 and T70.</li> </ul> <p>Fifty trees subject to potential roost feature assessments or tree climbing inspections in 2017/2018 within the Scheme boundary plus 50m were assessed as Low or Negligible suitability to support roosting bats (with no further surveys recommended):</p> <ul style="list-style-type: none"> <li>• M13, M16, M18, M19, M21, M22, M25, M27, M30, M31, M35, M39, M40, M41, <b>M42</b>, M44, M45, M47, M48, M49, M50, <b>M52</b>, T3, T4, T6, T7, <b>T14a, T15</b>, T25, T30, T56, T84, T85, T88, G1 – low suitability.</li> <li>• T5, T13, T14, T44, T57, T83, M8, M11, M12, M26, M43, T20, T27, T68, T76, – negligible suitability.</li> </ul> <p>Twelve trees were recorded as having suitability for hibernating bats (in <b>bold</b> text above):</p> <ul style="list-style-type: none"> <li>• M2, M12, M14, M23, M36, M42, M55, T14a, T15, T29, T31 and T69.</li> </ul> <p>At a further 17 trees, a full assessment of hibernation potential was not possible (access restrictions or not safe to climb) and should also be treated as having some suitability for hibernating bats as a precaution (in <b>bold</b> text above):</p> <ul style="list-style-type: none"> <li>• M1, M3, M4, M6, M10, M15, M24, M32, M33, M37, M38, M52, M53, T2, T21, T22 and T71.</li> </ul>			
Bats – foraging and commuting	As above	<p>There were significant changes in habitat suitability for foraging and commuting bats recorded in 2017; in comparison to 2015. This was based on the bat survey results from 2015, desk study data records, and updated survey guidance (BCT, 2016).</p> <ul style="list-style-type: none"> <li>• Kingsway junction: assessed as Low habitat suitability for foraging and commuting bats (spring, summer and autumn transects undertaken).</li> <li>• Markeaton junction: assessed as Moderate to High habitat suitability for foraging and commuting bats (bat trapping and radio tracking and transects alongside the Kingsway junction surveys).</li> <li>• Little Eaton – assessed as Moderate habitat suitability for foraging and commuting bats (monthly transect surveys April to October undertaken).</li> </ul> <p>Key bat activity hotspots were identified within Markeaton Park, to the west of Mackworth Park (and along Mickleover Railway Cutting LWS), along the River Derwent (north and south of the A38; in association also with the A38 Scrub Other Site of Interest), and to the north of the B2 Flood Arch bridge at Little Eaton junction (Talbot Turf land holding). Bats were also noted potentially using the footbridge at Markeaton Park as a navigational cue; with hotspots identified either side.</p> <p>The bat trapping and radio tracking exercise in 2017 at Markeaton junction confirmed Markeaton Park to be a valuable foraging and commuting habitat for bats (with one bat travelling up to 5km from its roost site to the park). The trapping also resulted in the third record of a serotine bat for Derbyshire.</p> <p>Bat trapping surveys in 2015 at Little Eaton junction confirmed whiskered bats as one of the myotis species using the site for foraging and commuting. However, no roosts were found at Little Eaton junction during subsequent roost surveys.</p>	Figures 8.21 and 8.22	Appendix 8.9(d), 8.9(e) and 8.9(f)	Scoped in
Badgers	Records returned ████████ of the Scheme.	Badger surveys (including territory analysis) were conducted between 2015 and 2018 across the Scheme footprint. Several badger social groups were identified ████████ of the Scheme.	Figures 8.23 CONFIDENTIAL and 8.24 CONFIDENTIAL	Appendix 8.10(a) CONFIDENTIAL and 8.10(b) CONFIDENTIAL	Scoped in
Hedgehogs	DWT record dated 2017 located approximately 50m from the Scheme boundary near Markeaton Park. Hedgehog record at Queensway from Hedgehog Street online 2018 (not shown on Figure).	Hedgehogs were observed within Markeaton Park during the bat surveys conducted in 2018. The mixed urban habitats present within Markeaton Park and the gardens of properties at Queensway were considered optimal habitat for hedgehogs.	Figure 8.25	N/A	Scoped in
Water vole	Records of water vole exist within 1km of the Scheme as well as from numerous watercourses that flow through or adjacent to the Scheme. However, all these records date from more than 10 years.	Waterbodies surveyed for water vole in 2015 were re-surveyed in 2017 (Bramble Brook at Kingsway junction; Markeaton Brook, Markeaton Lake, Mill Pond 1 and 2, and Markeaton Brook at Markeaton junction; and Dam Brook, Watermeadows Ditch, River Derwent and Boosemoor Brook at Little Eaton junction). New watercourses/stretchers of watercourse were also surveyed in 2017 as a result of Scheme boundary changes: Lower reaches of Bramble Brook at Kingsway junction; Middle Brook at Markeaton junction and upper and lower reaches of the River Derwent, lower reaches of Watermeadows Ditch and drain Pb1 at Little Eaton junction.	Figures 8.26 and 8.27	Appendix 8.11(a) and 8.11(b)	Scoped out (The future risk of water vole being present in the Dam Brook channel is low. However, precautionary mitigation strategy would be put in place –

Species	Desk study data 2018	Summary of most recent (≤2 years) and/or relevant field survey data	ES Figure reference [TR010022/APP/6.2]	Appendix* [TR010022/APP/6.3]	Scoped into or out of the assessment
		<p>sections during surveys in 2017.</p> <p>Further surveys in 2018 were conducted at drain Pb1, Watermeadows Ditch, Dam Brook and the River Derwent at Little Eaton junction. No water vole latrines were recorded on drain Pb1, Watermeadows Ditch or the River Derwent. Water vole latrines were recorded in spring 2018 on Dam Brook (which concurs with the water vole field sign found on Watermeadows Ditch in 2015). However, no signs of water vole were found on Dam Brook during extensive field surveys (including deployment of artificial latrine pads) in late summer 2018. Additionally, burrows observed at the water's edge, low down on the bank, were deemed likely to be those from signal crayfish rather than water vole. It is thus assumed that the water vole population is no longer present within Dam Brook.</p>			refer to Section 8.9).
Otter	No records of otter from within the last ten years at Kingsway and Markeaton. Two recent otter records were found at Little Eaton junction.	<p>Waterbodies surveyed for otter in 2015 were re-surveyed in 2017 (Bramble Brook at Kingsway junction; Markeaton Brook, Markeaton Lake, Mill Pond 1 and 2, and Mackworth Brook at Markeaton junction; and Dam Brook, Watermeadows Ditch, River Derwent and Boosemoor Brook at Little Eaton junction). New watercourses/stretchers of watercourse were also surveyed in 2017 as a result of Scheme boundary changes, namely at: lower reaches of Bramble Brook at Kingsway junction; and upper and lower reaches of the River Derwent, lower reaches of Watermeadows Ditch and drain Pb1 at Little Eaton junction.</p> <p>Otter field signs (spraints) were recorded on Markeaton Brook only in 2017. No otter field signs were found on Bramble Brook in 2017; however, this absence was considered likely to be temporary given the single sprint recorded in 2015; extent of otter territories; and proximity of otter field signs at Markeaton junction. Based on the 2015 and 2017 survey findings otter are present at Kingsway and Markeaton junctions with watercourses used as both foraging and commuting routes. Two potential holt sites at Markeaton junction identified in 2015 were found not to be in use in 2017.</p> <p>Further surveys in 2018 were conducted at drain Pb1, Watermeadows Ditch, Boosemoor Brook, Dam Brook and the River Derwent at Little Eaton junction. Otter were recorded on the Watermeadows Ditch and throughout the River Derwent within the Scheme boundary and within 250m upstream and downstream of the A38 bridge over the River Derwent. No otter signs were found on Boosemoor Brook or Dam Brook. However, it is considered that these may be used as commuting routes for otters given the location of more suitable upstream habitat (on Boosemoor Brook) and connectivity to Watermeadows Ditch downstream (of Dam Brook). Due to the lack of suitable otter habitat and otter signs (spraints) on drain Pb1; it was considered that otters were absent from this watercourse in 2017.</p>	Figures 8.28 and 8.29	Appendix 8.11(a) and 8.11(b)	Scoped in  (Foraging and commuting otter only at Kingsway and Markeaton junctions; and Little Eaton junction).
White-clawed crayfish	At Kingsway and Markeaton junctions, white-clawed crayfish <i>Austropotamobius pallipes</i> records were identified within 2km of the junctions. At Little Eaton junction eleven records of white-clawed crayfish were identified within 2km of the junction and this included a record of a single female white-clawed crayfish within a section of Dam Brook.	<p>During field surveys in 2015 at Kingsway and Markeaton junctions, four sections of watercourse were identified as having potential to support white-clawed crayfish populations (Markeaton Lake, Mill Pond 1, Mill Pond 2 and Middle Brook). However, no white-clawed crayfish were found in any of the surveyed watercourses. American signal crayfish <i>Pacifastacus leniusculus</i> were found on the western end of Markeaton Lake. It is highly likely that there is a strong correlation between the increasing numbers of signal crayfish (carriers of the well documented crayfish plague <i>Aphanomyces astaci</i>) and the absence of white-clawed crayfish downstream of Markeaton Park. This includes; the rest of Markeaton Lake, Mill Pond 1, Mill Pond 2, and the connecting Middle Brook that flows into the lower Markeaton Brook.</p> <p>During field surveys in 2015 at Little Eaton junction, four watercourses were identified as having potential to support white-clawed crayfish populations (River Derwent, Watermeadows Ditch, Dam Brook and Boosemoor Brook). One white-clawed crayfish was recorded within Dam Brook. Updated surveys were undertaken in 2017 and 2018 at Little Eaton junction. No white-clawed crayfish were found. Signal crayfish were identified on both the Watermeadows Ditch and the Dam Brook downstream and upstream of Little Eaton junction (at the weir) in 2017/18. It is considered that white-clawed crayfish are absent from these watercourses at Little Eaton junction.</p>	Figures 8.30 and 8.31	Appendix 8.12(a), 8.12(b) and 8.12(c)	Scoped out (However, mitigation measures in place for prevention of spread of crayfish plague due to the presence of American signal crayfish – refer to Section 8.9).
Terrestrial invertebrates	Terrestrial invertebrate records included one species listed on Schedule 5 of the WCA, 33 species listed as species of principal importance, 36 species listed on the LBAP and one invasive species.	<p>Terrestrial invertebrate surveys were conducted across semi-improved grassland areas within the Scheme boundary in 2015 (Sites A to G). These sites were reassessed in 2018 and updated surveys were conducted in 2018 on the following sites with notable habitat changes:</p> <ul style="list-style-type: none"> <li>• Site A: A38 Kingsway Roundabout LWS south island. This site was visited once in 2015 before health and safety considerations rendered the site unsafe to access. Changes in vegetation management in this area opened a safe access route and allowed three site visits in 2018.</li> <li>• Site C: Sturgess Field. This site was subject to three survey visits restricted to the western extent in 2015.</li> </ul> <p>A site at Little Eaton junction (proposed construction compound) which was not surveyed in 2015, was identified in 2017 as having potential to support terrestrial invertebrates. It was noted to have a mosaic of habitats with varied sward height grassland, scrub, and bare ground. This site was therefore subject to three terrestrial invertebrate surveys in 2018.</p> <p>All three sites surveyed in 2018 were assessed to be species diverse for terrestrial invertebrates;</p> <ul style="list-style-type: none"> <li>• Site A: A38 Kingsway Roundabout LWS south island. The survey identified 118 species of invertebrates across the three survey visits, including one S41 Priority Species (research only), namely: the cinnabar moth <i>Tyria jacobaea</i>. The open mosaic of grassland and scrub, with mature trees and deadwood was the habitat of highest importance for invertebrates within the site.</li> <li>• Site C: Sturgess Field. The survey identified 137 species of invertebrate within Sturgess Fields across the three</li> </ul>	Figures 8.32 and 8.33	Appendix 8.13(a) and 8.13(b)	Scoped in



Species	Desk study data 2018	Summary of most recent (≤2 years) and/or relevant field survey data	ES Figure reference [TR010022/APP/6.2]	Appendix* [TR010022/APP/6.3]	Scoped into or out of the assessment
		<p>survey visits, including two Nationally Rare species, a flower beetle <i>Ischnomera caerulea</i> and Scarlet shield bug <i>Eurydema dominulus</i>, one Endangered species <i>Eurydema dominulus</i>, one Red Data Book (RDB)<sup>15</sup> species a tachinid fly <i>Gonia divisa</i>, and one S41 Priority Species (research only) the cinnabar. The flower rich resources, with mature tree and wetland habitats was the habitat of highest importance for invertebrates within the site.</p> <ul style="list-style-type: none"> <li>Little Eaton junction construction compound: The survey identified 164 species of invertebrate across the three survey visits, including one Near Threatened species, small heath butterfly <i>Cecononympha pamphilus</i>, and one S41 Species of Principal concern small heath butterfly, one S41 Priority Species (research only) the cinnabar, and one Nationally Rare species <i>Ischnomera caerulea</i>. The open habitat with diverse nectar sources, deadwood and mature trees was the habitat of highest importance for invertebrates within the site. This site was considered the most species diverse out of three sites surveyed.</li> </ul> <p>Two rare key species; small heath butterfly and cinnabar moth, were recorded across the three sites in 2018; these species are listed on NERC S41 as Research Only due to documented decline. The low numbers of rare key species and a peak Species Quality Index (SQI) of &lt;4.0 for each of the sites, meant that these sites are not of significant importance for any terrestrial invertebrate species.</p> <p>The Kingsway hospital site (Site G), which was surveyed in 2015 and was comparable to the A38 Kingsway Roundabout south island (Site A), is considered to be species diverse with no notable habitat changes recorded in 2018. A peak count of 70 species were recorded in 2015. Five notable species were recorded; two butterfly (Lepidoptera) species; two notable species of hoverfly; and one species of bumblebee.</p> <p>The other sites surveyed in 2015 (Sites B, D, E and F) were less species diverse; with no notable habitat changes warranting survey in 2018. It is acknowledged that a casual record of the Nationally Scarce hoverfly <i>Pocota personata</i> was found at Talbot Turf site (Site E) in 2015 – however, the record did not reflect a breeding population within Site E. Additionally, an assemblage of notable terrestrial invertebrate species was also recorded in 2015 at Markeaton Park Grassland (Site D), and East of Little Eaton Junction Grassland (Site F). Notable species present included: wall brown butterfly; small heath; two species of hoverfly (<i>Volucella inanis</i> and <i>Volucella zonaria</i>); one species of bumblebee (<i>Hymenoptera, Aculeata</i>) <i>Bombus rupestris</i>.</p>			
Aquatic macroinvertebrates	<p>In regard to the Scheme, records were relatively common and of low conservation importance and do not have any statutory or non-statutory status.</p> <p>A baseline report received from DWT showed the presence of freshwater sponge in Markeaton Brook (Frith, 2009).</p>	<p>During field surveys in 2018 at Kingsway and Markeaton junctions:</p> <ul style="list-style-type: none"> <li>Markeaton Brook was identified of 'Moderate' to 'Very good' biological quality in the stretch sampled, and of "Low" to "Moderate" conservation value; supporting communities likely to be very sensitive to changes in water quality.</li> <li>Bramble Brook was of 'Moderate' to 'Good' biological quality and of 'Low' to 'Moderate' conservation value; supporting communities likely to be relatively tolerant to changes in water quality.</li> <li>Middle Brook was of 'Good' to 'Very Good' biological quality and of 'Moderate' conservation value; supporting communities likely to be sensitive to changes in water quality.</li> </ul> <p>During field surveys in 2015 at Little Eaton junction:</p> <ul style="list-style-type: none"> <li>The River Derwent, which flows through the survey area, was of "Very Good" biological water quality and "Fairly High" conservation value; supporting communities likely to be very sensitive to changes in water quality.</li> <li>Dam Brook was of 'Very Good' biological water quality and of 'Moderate' conservation value; supporting communities likely to be sensitive to changes in water quality.</li> </ul> <p>Most of the species recorded across the survey areas at Kingsway and Markeaton junction and Little Eaton junction were very common. The following species, formerly "Regionally Notable", were recorded; however, all have now been re-classified as "Least Concern" in the most recent Red Date Book (RDB):</p> <ul style="list-style-type: none"> <li><i>Baetis buceratus</i> (a mayfly): widespread in streams and rivers throughout England and Wales.</li> <li><i>Brachycentrus subnubilus</i> (a caddisfly): recorded in the River Derwent and Markeaton Brook, a species typical of clean rivers and large streams.</li> <li><i>Lepidostoma basale</i> (a caddisfly): recorded in the River Derwent, a species that occurs in a variety of unpolluted flowing waters.</li> </ul> <p>One "Notable (but not RDB)" species of caddisfly was recorded in Bramble Brook, <i>Tinodes unicolor</i>. This species has now been re-classified as of "Least Concern" in the most recent RDB.</p> <p>During the River Habitat Survey in 2018 there was a notable abundance of freshwater sponge (<i>Spongillidae</i> – an aquatic</p>	Figures 8.34 and 8.35	Appendix 8.14 and Appendix 8.5(a)	Scoped in

<sup>15</sup> Invertebrate rarity is based on the following Joint Nature Conservation Committee (JNCC) categories (Shirt, 1987): Red Data Book Category 1 RDB1 - Endangered (taxa in danger of extinction in the UK); Red Data Book Category 2 RDB2 – Vulnerable (taxa believed to be moving into endangered status in UK); Red Data Book Category 3 RDB3 – Rare (taxa with small populations in the UK); Red Data Book Category 4 RDB4 – Out of danger (taxa thought to be relatively secure); Red Data Book Category K RDBK – Insufficiently known (taxa that are suspected to belonging to the aforementioned groups, but lack of knowledge does not permit their classification as such); Nationally Scarce (notable) (species which are estimate to occur in 16 to 100 10km squares in the UK); Local (the term Local is not rigidly defined, but loosely means species confined to a particular habitat, but which are too widespread to be termed Nationally Scarce (Notable)).

Species	Desk study data 2018	Summary of most recent (≤2 years) and/or relevant field survey data	ES Figure reference [TR010022/APP/6.2]	Appendix* [TR010022/APP/6.3]	Scoped into or out of the assessment
		invertebrate) recorded throughout the survey section of Middle Brook (which forms part of Markeaton Brook LWS). Sponges are filter feeders and play an important role in filtering and recycling water. Their presence in abundance in Middle Brook may indicate good oxygenation and water quality or other factors providing optimal habitat conditions such as suitable firm, permanent substratum.			
Fish	-	Fish surveys were carried out in 2018 on Dam Brook and Watermeadows Ditch at Little Eaton junction to gather baseline data to assess the fish communities and evaluate the feasibility of relocating fish from Dam Brook to Watermeadows Ditch. One hundred and seventy seven fish were recorded in both survey sites with six species present in Dam Brook and four species in Watermeadows Ditch: <ul style="list-style-type: none"> <li>• Three protected/notable species were recorded in Dam Brook (brook lamprey <i>Lampetra planeri</i>, bullhead <i>Cottus gobio</i> and brown trout <i>Salmo trutta</i>) and one in Watermeadows Ditch (brook lamprey).</li> <li>• No invasive or non-native fish species were recorded.</li> <li>• Watermeadows Ditch is considered a suitable donor waterbody for brook lamprey, three-spined stickleback <i>Gasterosteus aculeatus</i> and stone loach <i>Barbatula barbatula</i> from Dam Brook (due to Dam Brook realignment as required by the Scheme).</li> <li>• Watermeadows Ditch is not considered a suitable donor waterbody for trout, bullhead and perch from Dam Brook due to poor habitat suitability and water quality (due to Dam Brook realignment as required by the Scheme). It is proposed that these latter species be relocated into the River Derwent.</li> </ul>	Figure 8.36	Appendix 8.15	Scoped in

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### **Importance of ecological features**

- 8.7.20 The importance (sensitivity) of ecological features within the study area that are scoped into the assessment (as identified in Table 8.9, Table 8.10 and Table 8.13) have been assessed in accordance with the guidance detailed in Section 8.3.
- 8.7.21 Table 8.14 summarises the ecological features identified in the study area and, along with rationale, details the ecological importance assigned to each.
- 8.7.22 Those species considered to be of at least Local importance, or are subject to some form of legal protection, were then scoped into the next stage of assessment.

**Table 8.14: Importance of ecological features**

Designated/non-designated site/habitat/species	Ecological feature	Kingsway and Markeaton junctions	Little Eaton junction	Rationale	Importance
<b>Designated and non-designated sites</b>					
Statutory designated sites	Gang Mine SAC, Bees Nest and Green Clay Pits SAC, Peak District SAC, South Pennine Moors SAC and SPA, River Mease SAC; and West Midlands Mosses SAC and Ramsar	✓	✓	<ul style="list-style-type: none"> <li>SACs, SPA and Ramsar protected areas internationally/in Europe which are legally protected.</li> </ul>	International or European
	Kedleston Park SSSI	✓	✗	<ul style="list-style-type: none"> <li>SSSI denoting a protected area in the UK which is legally protected.</li> </ul>	UK or National
	Breadsall Railway Cutting SSSI and LNR	✗	✓	<ul style="list-style-type: none"> <li>SSSI denoting a protected area in the UK which is legally protected.</li> <li>Breadsall Railway Cutting LNR overlaps with Breadsall Railway Cutting SSSI designation. Therefore, the higher geographical importance is assigned.</li> </ul>	UK or National
	Mickleover Meadows LNR	✓	✗	<ul style="list-style-type: none"> <li>Nature reserve designated by Derbyshire and/or the local authority.</li> </ul>	County or Unitary Authority
	Allestree Park LNR; Darley and Nutwood LNR; and Chaddesden Woods and Lime Lane Wood LNR	✗	✓	<ul style="list-style-type: none"> <li>Nature reserve(s) designated by Derbyshire and/or the local authority.</li> </ul>	County or Unitary Authority

Designated/non-designated site/habitat/species	Ecological feature	Kingsway and Markeaton junctions	Little Eaton junction	Rationale	Importance
Non-statutory designated sites	A38 Roundabout LWS	✓	✗	<ul style="list-style-type: none"> <li>LWS designated in Derbyshire; habitat of principal importance (species-rich semi-improved natural grassland); Highways Agency BAP 2002 habitat (grassland).</li> </ul>	County or Unitary Authority
	Bramble Brook and Margins LWS	✓	✗	<ul style="list-style-type: none"> <li>LWS designated in Derbyshire; LBAP habitat - rivers and streams; and Highways Agency BAP 2002 habitat (water features).</li> </ul>	County or Unitary Authority
	Markeaton Park LWS	✓	✗	<ul style="list-style-type: none"> <li>LWS designated in Derbyshire; habitat of principal importance (wood-pasture parkland); LBAP Habitat – Lowland wood pasture and veteran trees; and Highways Agency BAP 2002 habitat (woodland); NCA profile.</li> </ul>	County or Unitary Authority
	Markeaton Brook System LWS	✓	✗	<ul style="list-style-type: none"> <li>LWS designated in Derbyshire; LBAP habitat - rivers and streams; and Highways Agency BAP 2002 habitat (water features).</li> <li>Markeaton Brook is a Water Framework Directive (WFD) designated waterbody under the new 2015 official data, it is classified at Moderate status, currently failing to meet “Good Ecological Status” due to several failing elements including; phytobenthos; macrophytes; phosphates; and mitigation measures.</li> <li>The WFD waterbody; Markeaton Brook, forms part of the Humber River Basin Management Plan (RBMP), where Regulation 17 of the Water Environment (WFD) (E&amp;W) Regulations 2003 places a duty on each public body including local planning authorities to ‘have regard to’ RBMPs.</li> <li>Presence of freshwater sponge (Spongilla) recorded during the River Habitat Survey in 2018 and from desk study information (status for Derbyshire unknown).</li> </ul>	County or Unitary Authority

Designated/non-designated site/habitat/species	Ecological feature	Kingsway and Markeaton junctions	Little Eaton junction	Rationale	Importance
	Mickleover Railway Cutting LWS	✓	✗	<ul style="list-style-type: none"> <li>LWS designated in Derbyshire.</li> </ul>	County or Unitary Authority
	Alfreton Road Grassland LWS	✗	✓	<ul style="list-style-type: none"> <li>LWS designated in Derbyshire; LBAP Habitat – standing open water; and Highways Agency BAP 2002 habitat (water features).</li> </ul>	County or Unitary Authority
	The River Derwent LWS	✗	✓	<ul style="list-style-type: none"> <li>LWS designated in Derbyshire; Habitat of principal importance (rivers); LBAP habitat - rivers and streams; and Highways Agency BAP 2002 habitat (water features); NCA profile.</li> </ul>	County or Unitary Authority
	Watermeadows Ditch LWS	✗	✓	<ul style="list-style-type: none"> <li>LWS designated in Derbyshire; LBAP habitat - rivers and streams; and Highways Agency BAP 2002 habitat (water features).</li> </ul>	County or Unitary Authority
	Nooney's Pond LWS	✗	✓	<ul style="list-style-type: none"> <li>LWS designated in Derbyshire; Habitat of principal importance (ponds); LBAP Habitat – standing open water; and Highways Agency BAP 2002 habitat (water features).</li> </ul>	County or Unitary Authority
	Nutwood and Darley Abbey Wildlife Site LWS	✗	✓	<ul style="list-style-type: none"> <li>LWS designated in Derbyshire; LBAP (ancient woodland); Highways Agency BAP 2002 features (woodland and grassland)</li> </ul>	County or Unitary Authority
	Darley Park LWS	✗	✓	<ul style="list-style-type: none"> <li>LWS designated in Derbyshire; Habitat of principal importance (wood pasture and parkland); LBAP Habitat – wood pasture and parkland; and Highways Agency BAP 2002 habitat (woodland).</li> </ul>	County or Unitary Authority
	Allestree Park LWS	✗	✓	<ul style="list-style-type: none"> <li>LWS designated in Derbyshire; Habitat of principal importance (wood pasture); LBAP Habitat – wood pasture; and Highways Agency BAP 2002 habitat (woodland).</li> </ul>	County or Unitary Authority

Designated/non-designated site/habitat/species	Ecological feature	Kingsway and Markeaton junctions	Little Eaton junction	Rationale	Importance
	Chaddesden Wood and Lime Lane Wood LWS	x	✓	<ul style="list-style-type: none"> <li>LWS designated in Derbyshire; Habitat of principal importance (ancient woodland); Highways Agency BAP 2002 features (woodland).</li> </ul>	County or Unitary Authority
Non-designated sites of interest	Land off Kingsway PLWS	✓	x	<ul style="list-style-type: none"> <li>PLWS in Derbyshire; noted for its running water and small pond; Habitat of principal importance (ponds); LBAP Habitat – standing open water, rivers and streams; and Highways Agency BAP 2002 habitat (water features).</li> <li>Assessed for great crested newt suitability in 2017. No pond present; only flowing water. No suitability for other protected or notable species recorded.</li> </ul>	County or Unitary Authority
	A38 Scrub; Ford Lane; Des Lane Brook Course; Plantation site of interest; and Old Derby Canal.; and Boosemoor Brook.	x	✓	<ul style="list-style-type: none"> <li>Local areas of ecological interest (some yet to be fully assessed by the applicable authorities); site surveys during Phase 1 and/or other botanical surveys found no notable botanical interest at any of the sites.</li> <li>Boosemoor Brook noted as potentially suitable habitat for foraging and commuting otter during the otter 2017 and 2018 surveys.</li> <li>A38 Scrub, and edges of the Ford Lane site noted as a hotspot for foraging and commuting bats from 2017 bat activity surveys. Low suitability generally for roosting bats within the A38 Scrub site recorded in 2018 (one moderate suitability tree).</li> <li>No other suitability for protected or notable species recorded in association with these sites within or adjacent to the Scheme boundary.</li> </ul>	County or Unitary Authority
	Marsh Area Breadsall PLWS; Holme Nook Ponds; and Haslams Lane Brook course.	x	✓	<ul style="list-style-type: none"> <li>PLWS in Derbyshire; local areas of ecological interest (some yet to be fully assessed by the applicable authorities); Habitat of principal importance (ponds at Holme Nook Ponds) and LBAP Habitat – standing open water (ponds at Holme Nook Ponds).</li> </ul>	County or Unitary Authority

Designated/non-designated site/habitat/species	Ecological feature	Kingsway and Markeaton junctions	Little Eaton junction	Rationale	Importance
<b>Habitats</b>					
Grassland	Species rich semi-improved grassland	✓	✓	<ul style="list-style-type: none"> <li>Species rich semi-improved grassland at the A38 Roundabout LWS at Kingsway junction, on the embankment to the north of Little Eaton junction; and disturbed area of grassland established on a former landfill site to the north of Little Eaton junction.</li> <li>LBAP habitat – semi-natural grassland, and Highways Agency BAP 2002 habitat (grassland).</li> <li>In some areas of the A38 Roundabout LWS, the species rich semi-improved grassland is currently succeeding to scrub. Therefore, there are areas which could be considered of less nature conservation value.</li> </ul>	County or Unitary Authority
	Poor semi-improved grassland	✓	✓	<ul style="list-style-type: none"> <li>LBAP habitat – semi-natural grassland, and Highways Agency BAP 2002 habitat (grassland).</li> <li>Although semi-natural grassland is identified as an LBAP habitat, most of the grassland surveyed was species-poor and of limited ecological value, in comparison to those areas identified as species-rich. Semi-natural grassland is, however, known to support a variety of species including invertebrates and nesting birds.</li> </ul>	Local
	Marshy grassland	✘	✓	<ul style="list-style-type: none"> <li>Highways Agency BAP 2002 habitat (grassland)</li> <li>Marsh woundwort <i>Stachys palustris</i>, a grassland indicator species was recorded within areas of impeded drainage in 2017, but not found in 2018.</li> <li>Only area of marshy grassland recorded across the Scheme.</li> </ul>	Local



Designated/non-designated site/habitat/species	Ecological feature	Kingsway and Markeaton junctions	Little Eaton junction	Rationale	Importance
Trees	Veteran trees across the Scheme	✓	x	<ul style="list-style-type: none"> <li>LBAP habitat – lowland wood pasture and veteran trees; habitat of principal importance (wood pasture and parkland); Highways Agency BAP 2002 habitat (woodland); and NCA profile.</li> <li>These features are located within Markeaton Park LWS, whilst the arboricultural survey identified several isolated trees (refer to Appendix 7.2 [TR010022/APP/6.3]).</li> <li>Veteran trees are a particularly valuable resource in Derbyshire, and Markeaton Park LWS is specifically designated for its wood pasture and parks including veteran trees. Therefore, these features have been assessed as being of greater than Local value.</li> <li>Veteran trees are of significant value to nesting birds, invertebrates and bats.</li> </ul>	Up to County or Unitary Authority
Woodland	Semi-natural broadleaved woodland	✓	x	<ul style="list-style-type: none"> <li>LBAP habitat – lowland broadleaved mixed woodland; habitat of principal importance (lowland mixed deciduous woodland); Highways Agency BAP 2002 habitat (woodland); and NCA profile.</li> <li>Note surveys of the A38 Scrub (broadleaved pasture woodland) did not identify any notable species during dedicated botanical surveys and considered to be only of Local value.</li> </ul>	Up to County or Unitary Authority
	Mixed plantation woodland, broadleaved plantation and/or coniferous plantation.	✓	✓	<ul style="list-style-type: none"> <li>Highways Agency BAP 2002 habitat (woodland). No other notable references.</li> <li>This habitat may be of value to local wildlife including nesting birds and bats.</li> </ul>	Local

Designated/non-designated site/habitat/species	Ecological feature	Kingsway and Markeaton junctions	Little Eaton junction	Rationale	Importance
Standing water	A network of water bodies within designated sites; non-designated sites; and including all other ponds within 50m of the Scheme (also includes those assessed for great crested newts up to 500m from the Scheme boundary).	✓	✓	<ul style="list-style-type: none"> <li>• LBAP habitat – standing open water; habitat of principal importance (ponds); and Highways Agency BAP 2002 habitat (water features).</li> <li>• Standing water is located within some LWS designated sites; Alfreton Road Grassland LWS; and Nooney’s pond LWS.</li> <li>• Botanical surveys confirmed the area of standing water at Alfreton Road Grassland LWS is species-rich in terms of flora diversity.</li> <li>• Ponds are located within some non-designated sites of interest including Holme Nook Ponds site of interest and Land off Kingsway PLWS (however pond confirmed not to be present in Land off Kingsway PLWS during 2017 amphibian surveys); these are specifically noted for their open water habitat.</li> <li>• All other ponds within 50m of the Scheme are generally widespread within the survey area and considered to be of less value.</li> <li>• All standing water is of potential ecological value to amphibians, birds and aquatic invertebrates.</li> </ul>	County or Unitary Authority
Running water	Watercourses within designated sites; non-designated sites; and other watercourses within and/or adjacent to the Scheme.	✓	✓	<ul style="list-style-type: none"> <li>• LBAP habitat – rivers and streams; habitat of principal importance for rivers (River Derwent), Highways Agency BAP 2002 habitat (water features); and NCA profile (River Derwent).</li> <li>• Running water within some LWS designations including Bramble Brook and Margins LWS; Markeaton Brook System LWS; the River Derwent LWS; and Watermeadows Ditch LWS.</li> <li>• Running water within some non-designated sites including Boosemoor Brook site of interest at Little Eaton junction. Other watercourses within and adjacent to the Scheme include Bramble Brook at Kingsway junction; and Dam Brook and a ditch to the north of Little Eaton junction.</li> </ul>	County or Unitary Authority

Designated/non-designated site/habitat/species	Ecological feature	Kingsway and Markeaton junctions	Little Eaton junction	Rationale	Importance
				<ul style="list-style-type: none"> <li>• These habitats support otter, birds and aquatic macroinvertebrates/invertebrates (incl. freshwater sponge in Middle Brook).</li> <li>• The River Derwent has high/very high sensitivity due to the use of the River Derwent for its portable water supply – refer to Chapter 13: Road Drainage and the Water Environment.</li> </ul>	
Arable	Arable (field margins)	x	✓	<ul style="list-style-type: none"> <li>• Although this is an LBAP and habitat of principal importance, only a limited area exists within the extent of the Scheme and not noted to be of botanical interest.</li> <li>• Arable field margins are of value to local ecology including nesting birds.</li> </ul>	Local
Hedgerows	Species-poor hedgerows	x	✓	<ul style="list-style-type: none"> <li>• Habitat of principal importance; Highways Agency BAP 2002 habitat. No hedgerows were classified as important under the Hedgerow Regulations during botanical surveys.</li> <li>• Hedgerows provide wildlife dispersal corridors and provide connectivity to the wider landscape beneficial for fauna.</li> </ul>	Local
Other habitats	Amenity grassland, improved grassland, scattered and dense scrub, scattered trees, tall ruderal hard standing and buildings.	✓	✓	<ul style="list-style-type: none"> <li>• No notable or protected habitats. Common habitats found within the surrounding area, of limited ecological interest.</li> <li>• The spread of invasive non-native plant species under Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) is acknowledged.</li> </ul>	Site Invasive non-native plant species – illegal to spread into the wild.

Designated/non-designated site/habitat/species	Ecological feature	Kingsway and Markeaton junctions	Little Eaton junction	Rationale	Importance
<b>Legally protected and notable species</b>					
Toads	A population of toads within the network of waterbodies at Markeaton catchment (Ponds Pa6, Pa7 and Pa8).	✓	✗	<ul style="list-style-type: none"> <li>LBAP species and species of principal importance at a local level.</li> </ul>	Local
Birds	Barn owl at Little Eaton junction.	✗	✓	<ul style="list-style-type: none"> <li>Schedule 1 legally protected species.</li> <li>No evidence of barn owl nesting. However, barn owl heard in the area.</li> </ul>	County or Unitary Authority
	An assemblage of notable farmland birds on the pastoral land and arable land to the east of the A38 at Little Eaton junction.	✗	✓	<ul style="list-style-type: none"> <li>The pastoral and arable land to the east of the A38 at Little Eaton junction supports several notable farmland species, including yellowhammer, yellow wagtail, linnet, reed bunting and skylark; all are Birds of Conservation Concern (BoCC) Red or Amber<sup>16</sup> list species; species of principal importance; and LBAP species.</li> </ul>	Local
	A population of nesting lapwing south-west of Little Eaton junction.	✗	✓	<ul style="list-style-type: none"> <li>Nesting lapwing in 2015 present south-west of Little Eaton junction; seasonally flooded pastoral land used by waders and waterfowl. Lapwing has been confirmed breeding; peak count of eight individual lapwings observed and one confirmed breeding territory within 50m of the Scheme.</li> <li>Lapwing recorded again during 2017 breeding bird surveys in same</li> </ul>	County or Unitary Authority

<sup>16</sup> Eaton et al (2015) have published lists of Birds of Conservation Concern (BoCC). Red listed species are those whose breeding population or range is rapidly declining (50% or more in the last 25 years), recently or historically, and those of global conservation concern. Amber Listed species are those whose breeding population is in moderate decline (25 to 49% in the last 25 years), rare breeders, internationally important and localised species and those of unfavourable conservation status in Europe. Green listed species are those not of immediate conservation concern. Non-native species are classified as not assessed. These lists confer no legal status; however, they are useful when assessing the significance of predicted impacts and determining the level of mitigation that may be required when birds are affected by development or any other activity. Furthermore, inclusion on the red list is a factor in determining the species for which BAPs are developed.

Designated/non-designated site/habitat/species	Ecological feature	Kingsway and Markeaton junctions	Little Eaton junction	Rationale	Importance
				<p>area as in 2015 and likely to be nesting. Peak count of six individual lapwings observed with one likely breeding territory on site and within 50m of the Scheme.</p> <ul style="list-style-type: none"> <li>BoCC Red List; species of principal importance; and LBAP species.</li> </ul>	
	<p>Presence of the Schedule 1 little ringed plover and oystercatcher south-west of Little Eaton junction.</p>	x	✓	<ul style="list-style-type: none"> <li>One little ringed plover was recorded in 2015 during one visit, and although no definitive nesting behaviour was determined, this species may be nesting in suitable habitat close to the Scheme, south-west of Little Eaton junction.</li> <li>One little ringed plover recorded again on 2017 during the breeding bird surveys in the same field as in 2015. Likely to be nesting in the area, although no definitive evidence.</li> <li>Schedule 1 species and protected from disturbance.</li> <li>Two oystercatchers were recorded in 2015 close (approximately 75m) to the Scheme, and although no definitive nesting determined in 2015 or 2017, this species may be nesting in suitable habitat close to the Scheme south-west of Little Eaton junction.</li> </ul> <p>BoCC Amber List.</p>	<p>County or Unitary Authority for both species</p>
	<p>Common nesting bird species across the Scheme (including notable assemblage within the construction compound at Little Eaton junction).</p>	✓	✓	<ul style="list-style-type: none"> <li>All nesting birds are protected under the Wildlife and Countryside Act 1981 (as amended).</li> <li>Habitat present across the extent of the Scheme has potential to support nesting birds.</li> <li>General breeding bird interest in association with scrub at the proposed construction compound at Little Eaton junction.</li> </ul>	<p>Site (nesting birds legally protected)</p>

Designated/non-designated site/habitat/species	Ecological feature	Kingsway and Markeaton junctions	Little Eaton junction	Rationale	Importance
	Populations of wintering birds including lapwing, teal, and black-headed gull in the flooded field south-west of Little Eaton junction.	x	✓	<ul style="list-style-type: none"> <li>• Based on Fuller's Criteria<sup>17</sup> and professional judgement, the wintering bird assemblage recorded is assessed to be of no more than local importance. Only wetland species (23 in total) were recorded during the surveys, but even with inclusion of other wintering bird species (recorded incidentally during the surveys) the survey area was evaluated to be of no more than local importance to this species group.</li> <li>• No wintering bird population on site approaches the 1% level of the national population, which would have constituted a nationally significant wintering bird population.</li> <li>• Lapwing BoCC Red list; species of principal importance; and LBAP species.</li> <li>• Teal BoCC Amber list.</li> </ul>	Local

<sup>17</sup> Fuller (1980) details the diversity criteria, for bird species diversity. The number of bird species recorded in an area is a simple measure of diversity that can indicate its importance or conservation value at each season of the year. It is appreciated that in some instances the specific species present (e.g. those of general conservation concern) may be the most important determination of a site's conservation value, but nevertheless determining the overall species diversity within an area does provide another measure of conservation value. It should be noted that Fuller analysis was developed in the 1970s and species diversity has subsequently declined significantly (Eaton et al. 2015). As a result, Fuller's thresholds are likely to be too high in relation to contemporary bird population sizes.

Designated/non-designated site/habitat/species	Ecological feature	Kingsway and Markeaton junctions	Little Eaton junction	Rationale	Importance
Bats	Roosting bats – Noctule bat maternity roost (and suitable for hibernation) at tree M2.	✓	x	<ul style="list-style-type: none"> <li>A maternity roost of noctule bats (maximum count 10) was recorded in a tree within the footprint of the Scheme at Markeaton junction. Also identified to be of potential for hibernating bats.</li> <li>Noctule bats are LBAP species for Lowland Derbyshire. Highways Agency BAP 2002 lists all bat species. Also noted as rarer species (Wray, 2010).</li> <li>Noted that under the Wray 2010 Valuing Bats in Ecological Assessment this would be evaluated as Regional (maternity roost of rarer species). However, given the maximum count of 10 number bats and the widespread distribution in the county<sup>18</sup>, the noctule roost is assessed as County or Unitary Authority importance.</li> <li>Bats and their roosts are legally protected.</li> </ul>	County or Unitary Authority
	Roosting bats - Common pipistrelle maternity roost at the River Derwent bridge (B3) (outside but adjacent to the Scheme boundary).	x	✓	<ul style="list-style-type: none"> <li>The River Derwent Bridge (B3) is noted as an established maternity roost for common pipistrelle.</li> <li>Highways Agency BAP 2002 species (all bats).</li> <li>Bats and their roosts are legally protected.</li> </ul>	County or Unitary Authority <sup>19</sup>
	Roosting bats - a network of transient tree and structure roosts of common species (common pipistrelle, brown long-eared bat)	✓	✓	<ul style="list-style-type: none"> <li>Common and soprano pipistrelle are the commonest bats in Derbyshire and widespread<sup>20</sup>. Small occasional day roosts for the common and soprano pipistrelle were recorded at the flood arch underpass (B2) in 2017 and feeding roost for common and soprano pipistrelle recorded in 2018; and small occasional day roost of common pipistrelle within a house at Queensway (B8 QW30); both</li> </ul>	Local

<sup>18</sup> <http://www.derbyshiremammalgroup.org.uk/> accessed 29.11.18

<sup>19</sup> Based on Valuing Bats in Ecological Impact Assessment (Wray, 2010) scoring system

<sup>20</sup> <http://www.derbyshiremammalgroup.org.uk/> accessed 29.11.18

Designated/non-designated site/habitat/species	Ecological feature	Kingsway and Markeaton junctions	Little Eaton junction	Rationale	Importance
	and potentially soprano pipistrelle) – two confirmed roosts (B2, QW30) within the Scheme boundary; and confirmed/potential roosts located within 50m of the Scheme boundary.			<p>within the Scheme boundary.</p> <ul style="list-style-type: none"> <li>• Single bat day roosts for common pipistrelle were recorded at two locations at buildings (B9) adjacent to Little Eaton junction.</li> <li>• Brown long-eared bats are widespread and frequently occurring<sup>21</sup>. A feeding roost of three brown long-eared bats was recorded at the flood arch underpass (B2) in 2015.</li> <li>• LBAP species (soprano pipistrelle); species of principal importance (soprano pipistrelle and brown long-eared bats); and Highways Agency BAP 2002 species (all bats).</li> <li>• Bats and their roosts are legally protected.</li> </ul>	
	Roosting bats – small occasional day roost of whiskered bat – listed as a rarer species than pipistrelle and long-eared.	✓	x	<ul style="list-style-type: none"> <li>• Whiskered bats are considered widespread but localised within the county. A small number of whiskered bats, including breeding females, are known to commute and forage near Little Eaton junction. Baseline data also suggests a whiskered bat breeding roost exists beyond the Scheme boundary, but in the general locality.</li> <li>• Approximately 30 bat droppings attributed to this species (through DNA analysis) were recorded in the roof void of building B8 - QW30. This is consistent with a small or single bat occasional day roost.</li> <li>• Bat roost surveys (three in 2017 and two in 2018) did not record any bat activity by this species in relation to this building.</li> <li>• Bats and their roosts are legally protected.</li> </ul>	Local

<sup>21</sup> <http://www.derbyshiremammalgroup.org.uk/> accessed 29.11.18



Designated/non-designated site/habitat/species	Ecological feature	Kingsway and Markeaton junctions	Little Eaton junction	Rationale	Importance
	Roosting bats – potential roosting features identified in buildings, structures and trees across the Scheme (with no confirmed roost).	✓	✓	<ul style="list-style-type: none"> <li>Although these features surveyed are not in current use by bats, due to the transient nature of the species, there is potential for these to be used in the future.</li> </ul>	Up to Local
	Foraging and commuting bats – populations of ‘rarer’ species (Whiskered, Brandt’s, Daubenton’s, natterer’s, noctule and serotine recorded at Markeaton Park north of the Scheme; Daubenton’s and whiskered/Brandt’s were recorded foraging along the River Derwent including where the A38 crossed the river; occasional Leisler’s or serotine were recorded near the Little Eaton junction).	✓	✓	<ul style="list-style-type: none"> <li>Whiskered, Brandt’s, Daubenton’s, Natterer’s, noctule, Leisler’s and serotine bats are classified as rarer bats nationally (Wray et al 2010).</li> <li>Noctule and Daubenton’s bats are widespread within the county<sup>22</sup>; Daubenton’s were recorded at the River Derwent, which provides a mosaic and complex network of habitats providing high value foraging habitats. Noctule bats were recorded at various locations throughout site, and around open fields at Little Eaton junction, directly south of the Scheme. Noctule bats are LBAP species for Lowland Derbyshire.</li> <li>Whiskered bats are considered widespread but localised within the county. The status of Brandt’s bats is uncertain due to the difficulty in distinguishing these from whiskered bats.<sup>23</sup> A small number of whiskered bats, including breeding females, are known to commute and forage near Little Eaton junction. Baseline data also suggests a whiskered bat breeding roost exists beyond the Scheme boundary, but in the general locality.</li> </ul>	County or Unitary Authority <sup>25</sup>

<sup>22</sup> <http://www.derbyshiremammalgroup.org.uk/ accessed 29.11.18>

<sup>23</sup> <http://www.derbyshiremammalgroup.org.uk/ accessed 29.11.18>

<sup>25</sup> Based on Valuing Bats in Ecological Impact Assessment (Wray, 2010) scoring system

Designated/non-designated site/habitat/species	Ecological feature	Kingsway and Markeaton junctions	Little Eaton junction	Rationale	Importance
				<ul style="list-style-type: none"> <li>Two single records of serotine bats were recorded. The status of serotine is uncertain in the county with the locality representing only the second location within the county where this species has been recorded. The only known breeding roost for this species in the county was formerly located (now lost) within 5km of the Scheme<sup>24</sup>.</li> </ul>	
	Foraging and commuting bats - populations of 'common' species (common pipistrelle, soprano pipistrelle and brown long-eared).	✓	✓	<ul style="list-style-type: none"> <li>Moderate to high levels of common and soprano pipistrelle commuting and foraging activity was recorded at Markeaton Park and Markeaton Lake.</li> <li>Low but widespread common and soprano pipistrelle bat activity was detected during transect surveys undertaken at Little Eaton junction. However, high levels of foraging and bat activity were recorded at the River Derwent.</li> <li>The levels of common and soprano pipistrelle bat activity at Markeaton Park, Earl of Harrington Lake and the River Derwent suggest that these habitats are valuable to bats within the wider area.</li> <li>LBAP species (soprano pipistrelle); species of principal importance (soprano pipistrelle); and Highways Agency BAP 2002 species (all bats).</li> <li>Brown long-eared bats were recorded foraging within the vicinity of Long Eaton junction, including around B2 Flood Arch Bridge. Brown long-eared are LBAP species for Lowland Derbyshire.</li> </ul>	County or Unitary Authority <sup>26</sup>

<sup>24</sup> <http://www.derbyshirebats.org.uk/bats-in-derbyshire> accessed 29.11.18

<sup>26</sup> Based on Valuing Bats in Ecological Impact Assessment (Wray, 2010) scoring system

Designated/non-designated site/habitat/species	Ecological feature	Kingsway and Markeaton junctions	Little Eaton junction	Rationale	Importance
Badger	Badger social groups present in the areas surveyed.	✓	✓	<ul style="list-style-type: none"> <li>Badgers are legally protected under The Protection of Badgers Act 1992 and are listed on the Highways Agency BAP 2002 but are not rare.</li> <li>Several social groups are present within [REDACTED] of the Scheme.</li> <li>[REDACTED]</li> </ul>	Local
Hedgehogs	A notable population of hedgehogs at Markeaton junction in association with urban habitats (Markeaton Park and Queensway gardens).	✓	x	<ul style="list-style-type: none"> <li>Hedgehogs are a Species of Principal Importance. In the last 10 years, hedgehog numbers have fallen by 30% nationally<sup>27</sup>.</li> <li>Hedgehogs are known to be present at Markeaton Park and within the gardens of properties at Queensway from surveys conducted in the area and desk studies.</li> </ul>	Local
Otter	A population of otter across the Scheme.	✓	✓	<ul style="list-style-type: none"> <li>Otters (foraging and commuting) are present (or assumed to be present) on all watercourses surveyed within 250m of the Scheme (except Pb1).</li> <li>No otter holts found or confirmed across the Scheme.</li> <li>LBAP species; species of principal importance; and Highways Agency BAP 2002 species. Legally protected under WCA 1981 (as amended) and European legislation.</li> </ul>	County or Unitary Authority

<sup>27</sup> <https://www.derbyshirewildlifetrust.org.uk/helping-hedgehogs> accessed 10.12.18

Designated/non-designated site/habitat/species	Ecological feature	Kingsway and Markeaton junctions	Little Eaton junction	Rationale	Importance
Terrestrial invertebrates	An assemblage of terrestrial invertebrates, including notable species recorded at various locations within the extent of the Scheme.	✓	✓	<ul style="list-style-type: none"> <li>• Many of the species recorded were common and associated with the three main habitats present within the extent of the Scheme; standing water, woodlands and dry grassland.</li> <li>• The Little Eaton proposed construction compound was the most species diverse of the three sites across the Scheme surveyed in 2018. Notable species included two Near Threatened species, one S41 Species of Principal concern, one S41 Priority Species (research only) and one Nationally Rare species. The low numbers of key species indicated that the site was significant at the Local level in terms of invertebrate assemblage.</li> <li>• A38 Kingsway Roundabout LWS (Site A) - notable species included two Nationally Rare species, one Endangered species, and one S41 Priority Species (research only). The low numbers of key species indicated that the site was significant at the Local level in terms of invertebrate assemblage.</li> <li>• Sturgess Field (Site C) notable species included two Nationally Rare species, one Endangered species, and one S41 Priority Species (research only). The low numbers of key species indicated that the site was significant at the Local level in terms of invertebrate assemblage.</li> <li>• Kingsway Hospital (Site G) was recorded as species diverse in 2015. An assemblage of notable terrestrial invertebrate species was also recorded at various other locations in 2015, however, all are considered overall to be of no more than local importance.</li> </ul>	Local

Designated/non-designated site/habitat/species	Ecological feature	Kingsway and Markeaton junctions	Little Eaton junction	Rationale	Importance
Aquatic macro-invertebrates	An assemblage of aquatic macroinvertebrates, recorded in Bramble Brook, Markeaton Brook, Middle Brook, Dam Brook and the River Derwent.	✓	✓	<ul style="list-style-type: none"> <li>The aquatic macroinvertebrate communities recorded in all watercourses were sensitive to changes in water quality except those at Bramble Brook which were considered more tolerant.</li> <li>River Derwent had the highest conservation value.</li> <li>Dam Brook and the River Derwent had the highest biological water quality.</li> <li>Species recorded were relatively widespread and have no statutory or non-statutory designations.</li> </ul>	County or Unitary Authority
Fish	A population of protected and notable fish species in Dam Brook (brook lamprey <i>Lampetra planeri</i> , bullhead <i>Cottus gobio</i> and brown trout <i>Salmo trutta</i> )	x	✓	<ul style="list-style-type: none"> <li>Because of a decline in several parts of Europe, the brook lamprey is now listed in Annexes IIa and Va of the Habitats Directive, Appendix III of the Bern Convention.</li> <li>The WFD also protects lamprey populations as development cannot cause deterioration in the river status, which includes all species that rely on the aquatic environment.</li> <li>Bullhead is an RDB species.</li> <li>Brown trout are listed as a Species of Principal Importance.</li> </ul>	County or Unitary Authority

### **Future baseline**

8.7.23 As detailed within Chapter 4: Environmental Impact Assessment Methodology, to identify the effects of the Scheme on biodiversity features, it is important to understand the baseline (at year of construction) and future baseline (at year of opening and operation), as these may be different from those that currently exist. Such changes could alter the sensitivity of existing biodiversity features, as well as introduce new sensitive biodiversity features.

### **Construction year baseline (2020)**

8.7.24 The baseline details as reported in the sections above describes the biodiversity features as they were in the years that the surveys and desk top baseline studies were undertaken (2015 to 2018), with the main works construction starting in early 2021.

8.7.25 Preliminary works associated with the Scheme are anticipated to start in late 2020, subject to securing a DCO (refer to Chapter 2: The Scheme, Section 2.6).

8.7.26 Most of the land that would be impacted by the Scheme (and in its vicinity) at Kingsway junction and Markeaton junction comprise the existing A38 highway and other highway infrastructure, as well as surrounding residential areas and areas of public open space. At Little Eaton junction, most of the land that would be impacted by the Scheme (and in its vicinity) comprises agricultural land as well as the existing A38 highway and other highway infrastructure, plus residential and commercial areas. As such, environmental baseline conditions are not anticipated to change significantly by 2020 from the conditions as detailed above. However, as detailed in Chapter 15: Assessment of Cumulative Effects, several development projects are ongoing, or are planned, that have the potential to change baseline conditions. Whilst these are not likely to significantly change baseline conditions within the biodiversity study area, the following key changes are anticipated by the construction baseline year (2020) (the number in brackets refers to the development numbers as detailed in Appendix 15.2 [TR010022/APP/6.3]):

- A new footpath with Mackworth Park (No 5) will be operational.
- The development at Radbourne Lane (Langley Country Park) (No 48) will have been completed. Developments within the Mackworth College site (No 6), within the Kingsway hospital site (No 21) and land north of Mansfield Road (Breadsall) (No 39/47) will be further progressed.
- The NHS carpark for 600 cars located to the west of Kingsway Hospital and north of Northmead Drive (No 22) will have been fully developed and will be operational.
- Residential developments at Hackwood Farm (No 29/41), land south of Mansfield Road (Breadsall) (No 40), and land at Kedleston Road (No 49) are anticipated to have been started with resultant land clearance.

8.7.27 Other minor developments near the Scheme which are considered to have been completed by late 2020, and thus will be part of the prevailing baseline, are detailed in Appendix 15.2 [TR010022/APP/6.3].

- 8.7.28 In addition, as detailed in Chapter 2: The Scheme, Section 2.4.5, by mid-2019 DCiC plans to have in place their approach to address roadside nitrogen dioxide (NO<sub>2</sub>) air quality issues within the city, namely the introduction of a series of traffic management measures based around Stafford Street, complemented by wider network management (includes junction improvements to the Ashbourne Road/Uttoxeter Old Road junction, Uttoxeter New Road/Stafford Street junction, and Ford Street/Friar Gate junction).
- 8.7.29 It is anticipated that the various developments as detailed above will not significantly change the prevailing environmental conditions within the Scheme boundary, nor baseline conditions within the defined biodiversity study area.
- 8.7.30 In terms of habitats and flora species, the biodiversity baseline is unlikely to change significantly by 2020, unless any large-scale changes in management practices occur. The transient and mobile nature of certain fauna species such as, badgers, birds, bats, otters and potentially water vole (although low risk) is acknowledged and, therefore, pre-construction surveys would be required in order to confirm construction year baseline conditions (refer to Section 8.9).

#### ***Opening year baseline (2024)***

- 8.7.31 It is not possible to accurately predict baseline environmental conditions for the year of Scheme opening (2024); however, it is anticipated that baseline conditions in the vicinity of the Scheme and within the associated biodiversity study area will largely be the same as at 2020, although most of the developments as detailed in Appendix 15.2 [TR010022/APP/6.3] are anticipated to have been completed by 2024. In addition, urban pressures associated with an increased population may result in the further expansion of the built environment.
- 8.7.32 Planned future developments have been taken into consideration during the assessment. For example, changes in future traffic baseline flows have been modelling both with and without the Scheme taking into account future development patterns. Modelling outcomes have been used to determine the potential effect of Scheme opening on the environment surrounding the Scheme e.g. noise, air quality, severance, water quality effects, biodiversity. Assessment of in-combination effects with climate change have also been taken into consideration (refer to Chapter 15: Climate).

## **8.8 Potential impacts**

- 8.8.1 Mitigation measures incorporated into the Scheme design and measures to be taken to manage Scheme construction are set out in Section 8.9. Prior to implementation of defined mitigation measures, the Scheme has the potential to affect biodiversity (positively or negatively), both during construction and once in operation- potential impact are detailed in the sections below.

### **Construction phase**

- 8.8.2 Most of the potential biodiversity impacts would arise during the Scheme construction phase. The potential impacts associated with construction are based on the construction phase lasting approximately 3.5 years (refer to Chapter 2; The Scheme, Section 2.6 and Illustration 2.1). The potential impacts relating to important biodiversity features are:

- **Habitat loss (or gain):** These are direct impacts related to the change in land use resulting from the Scheme. This would include vegetation clearance, change in use such as the creation of drainage ponds, habitat creation and enhancements opportunities.
- **Fragmentation of populations or habitats:** Indirect impacts due to breaking up of a habitat, ecosystem, or land-use type into smaller parcels, or the creation of partial or complete barriers to the movement of species, with a consequent impairment of ecological function (due to building the Scheme and its permanent presence).
- **Disturbance to species:** An indirect impact resulting from a change in normal conditions (such as light, noise) that would result in the important biodiversity feature changing its typical behaviour.
- **Disturbance (degradation) to habitats:** A direct or indirect impact resulting in the reduction in the suitability of the habitat for the identified important feature (such as changes in water quality).
- **Species mortality:** A direct impact on a population of a species associated with mortalities due to construction activities.

### Operational phase

8.8.3 The operational phase of the Scheme is when the Scheme becomes active. As such, all the potential impacts are associated with traffic use of the operational Scheme, plus its on-going long-term maintenance. The potential impacts of the Scheme during the operational phase relating to important biodiversity features are:

- **Species mortality:** A direct impact on a population of a species associated with mortalities from collisions with vehicles, possible pollution incidents and management practices.
- **Disturbance to species:** An indirect impact resulting from a change in normal conditions (such as light and noise from traffic) that would result in the important biodiversity feature changing its typical behaviour (such as changes in roosting behaviour).
- **Disturbance (degradation) to habitats:** An indirect impact resulting in reduction of the suitability of the habitat (following construction) for the identified important biodiversity features. Generally associated with winter management regimes such as salt spray, changes in air quality (traffic emissions) and surface water runoff (associated with vehicles being active on the road).

## 8.9 Design, mitigation and enhancement measures

8.9.1 Environmental considerations have been considered during the development of the Scheme design, to avoid and reduce potential impacts on biodiversity. This iterative approach has led to a range of mitigation measures capable of reducing the magnitude of impacts being embedded within the Scheme design or captured within the proposed construction and operational practices. Actions that have been taken that avoid or reduce potential biodiversity effects include the following:



- The Scheme design aims to retain as many of the existing trees within the Scheme boundary as possible – details of tree retention proposals are provided in Chapter 7: Landscape and Visual Impact Assessment. This includes appropriate layout design of the construction compound at Little Eaton junction to minimise tree losses (including tree loss along the Scheme boundary with Alfreton Road along the former Derby Canal). In addition, the Scheme design has aimed to avoid impacts upon veteran trees – as such the layout of the floodplain compensation area at Little Eaton junction would avoid three veteran trees to the north of the area, whilst the veteran tree located to the south of Little Eaton junction (within an area proposed for material storage) would be retained and appropriately protected during the Scheme construction phase. Similarly, the position of the replacement Markeaton footbridge was amended such that it largely occupies the footprint of the current footbridge to minimise tree losses.
- The Scheme design aims to minimise direct impact (habitat loss) on designated sites, non-designated sites and ecological habitats. Actions taken to minimise impacts includes:
  - Design of the Scheme avoids habitat loss associated with the Mickleover Railway Cutting LWS.
  - The design of the Scheme minimises land take (and tree loss) and avoids loss of veteran trees within the Markeaton Park LWS (for which the LWS site is designated) to ensure functional integrity of the site remains.
  - The existing Markeaton Lake culvert beneath the A38 connecting Markeaton Lake with Mill Pond would remain in situ and would not need to be extended, thus avoiding direct impacts to Markeaton Brook System LWS. Similarly, the Scheme would avoid impacts upon the existing culvert from Markeaton Lake to Middle Brook which forms part of the Markeaton Brook LWS. Retention of the existing culverts would also ensure that habitat connectivity is maintained for amphibians during both Scheme construction and operation.
  - The Scheme design avoids impacts upon the A38 bridge over the River Derwent.
  - The Scheme design avoids the loss of ponds.
  - The extent of permanent habitat loss has been minimised within Alfreton Road Rough Grassland LWS. The Scheme avoids loss of habitat in association with the inundation and drawdown zone which is of most value botanically and for birds using the field. Suitable grassland habitat reinstatement and creation has been included within the Scheme landscape design. In addition, the Scheme is not anticipated to significantly change the amount of water accumulating on the site as the main source of water is considered to be overflows from Dam Brook and Watermeadows Ditch.

- The Scheme design minimises removal of habitat in association with the A38 Scrub DE05.03 Site of Interest. Habitat loss (due to the need to access the floodplain compensation area from the A38 during the construction phase) would be re-instated.
- The layout of the construction compound to the north of Little Eaton junction aims to minimise the loss of species-rich grassland.
- The Scheme design aims to maximise biodiversity opportunities associated with other mitigation measures. This includes maximising biodiversity opportunities associated with the Scheme landscape design (refer to Figures 7.8a to 7.8c [TR010022/APP/6.2]), making effective use of areas of former carriageway made redundant by the Scheme (i.e. the Brackensdale Avenue access onto the A38; sections of existing carriageway associated with the existing northbound A38 from Markeaton junction; the existing access from Ford Lane onto the A38 (located between the River Derwent bridge and the bridge over the Midland Mainline railway line); and a section of existing A38 mainline carriageway located to the north of Little Eaton junction), maximising ecological and Water Framework Directive (WFD) opportunities at the flood storage areas at Kingsway junction and during the Bramble Brook and Dam Brook realignment works, as well as taking biodiversity opportunities associated with the highway drainage design. Such actions make a significant contribution to the Scheme objective to achieve NNL of biodiversity in accordance with the Highways England Biodiversity Plan (Highways England, 2015).

8.9.2 The Scheme construction phase would be the most disruptive period for ecology and nature conservation. Vegetation clearance would remove habitats in the short term, before the maturation of new landscape planting, whilst the exclusion of protected faunal species from the construction works areas would be required. This would cause disruption to local habitats and local faunal populations in the short term. Construction works would also cause temporary disruption and disturbance to some watercourses, with in-channel works and increased risk of pollution incidents (e.g. through increased siltation).

8.9.3 Given the above, construction of the Scheme would be subject to measures and procedures as defined within the Outline Environmental Management Plan (OEMP) for the Scheme (refer to Appendix 2.1 [TR010022/APP/6.3]). This includes a range of measures to mitigate potential impacts on ecological habitats, protected species and the water environment, which accord with legal compliance and good practice guidance. The measures detailed within the OEMP would be developed into a Construction Environmental Management Plan (CEMP) by the selected construction contractor which would be implemented for the duration of the Scheme construction phase. Measures which would be included within the CEMP include the following, which all assist in minimising impacts upon biodiversity receptors:

- Measures to mitigate air quality and dust impacts as detailed in Chapter 6: Air Quality.
- Measures to minimise lighting at construction areas as detailed in Chapter 7: Landscape and Visual Impact Assessment.

- Measures to mitigate noise impacts as detailed in Chapter 9: Noise and Vibration.
- Measures to mitigate impacts upon the water environment as detailed in Chapter 13: Road Drainage and the Water Environment.

- 8.9.4 Other measures specifically related to the protection of ecological sites and habitats, and protected species are detailed in the sections below. This includes for example, the requirement for site vegetation clearance to avoid the bird nesting period i.e. March to August (inclusive). Any vegetation clearance proposed outside of this time would need to be checked for the presence of any nest by a suitably qualified ecologist or Ecological Clerk of Works (ECoW), prior to removal. If active nests are found, then appropriate buffer zones would need to be put in place and the area monitored until the young birds have fledged.
- 8.9.5 Implementation of the CEMP would ensure that Scheme construction complies with legislation relating to protected species. It would also aim to ensure that the Scheme does not compromise the local conservation status of ecological features present within or near the Scheme. Where protected species licences are required, these would be obtained from NE sufficiently in advance of the works to meet with the optimum time for mitigation and to minimise any changes to the construction programme. Draft protected species licences have been produced for bats and badgers (where applicable) based on the Scheme design and baseline conditions as detailed in Section 8.7. This has involved consultation with NE through the Discretionary Advice Service on the proposed approach to mitigation, and then formal submission of draft licences through Pre-Submission Screening. Letters of No-Impediment have subsequently been received from NE and are included in Appendix 8.19 [TR010022/APP/6.3] which provides an agreement in principal on the essential mitigation measures proposed that are applicable to these species groups.
- 8.9.6 As detailed in Chapter 2: the Scheme, para. 2.7.8, as required by the OEMP (refer to Appendix 2.1 [TR010022/APP/6.3]), industry standard control measures would be applied and encapsulated in a Handover Environmental Management Plan (HEMP). Thus, upon completion of Scheme construction, the CEMP would be converted into the HEMP. The purpose of the HEMP would be to provide information relating to existing and future environmental commitments that would need to be delivered by those responsible for the future management and operation of the Scheme (i.e. by the East Midlands Asset Delivery team (Highways England)). The HEMP would include specific requirements concerning the long-term maintenance and management of landscaping incorporated into the Scheme, as well as the management of ecological and environmental mitigation features.
- 8.9.7 As detailed in the sections below, several mitigation features have been embedded within the Scheme design specifically to minimise effects upon biodiversity receptors (applicable to the various ecological features scoped into the assessment of at least Local value or which are legally protected as identified in Table 8.13). In reviewing the text below, reference should be made to the Environmental Masterplans as presented in Figures 2.12a to 2.12h [TR010022/APP/6.2], and the Environmental Mitigation Schedule (EMS) presented at Appendix 2.2 [TR010022/APP/6.3]. These illustrate the proposed

landscaping of the Scheme (refer to Figures 7.8a to 7.8c [TR010022/APP/6.2]), along with additional biodiversity mitigation features that have been incorporated into the Scheme design to meet specific species or habitat requirements. The Environmental Masterplans show both the mitigation for the anticipated impacts on biodiversity, as well as mitigation measures required for other environmental impacts where opportunities for biodiversity gains have been taken. In addition, the sections below highlight construction and operational phase management requirements that need to be included within the CEMP/HEMP (as applicable).

## Construction

### ***Designated and non-designated sites***

8.9.8 The following mitigation measures would be put in place to reduce the effects of potentially significant Scheme construction phase impacts on designated and non-designated sites (where applicable):

- **Pollution prevention control measures:** Water pollution prevention control measures and standard best practice measures to control construction dust and noise would be implemented during the construction phase via the CEMP (refer to Chapter 6: Air Quality; Chapter 9: Noise and Vibration; Chapter 13: Road Drainage and the Water Environment; and the OEMP in Appendix 2.1 [TR010022/APP/6.3]).
- **Translocation of species-rich grassland habitats from the A38 Roundabout LWS:** Top soil would be collected from within the A38 Roundabout LWS (located within Kingsway junction) and used to create a new species-rich grassland area within Markeaton Park (within the Scheme boundary – refer to Environmental Masterplan Figure 2.12d [TR010022/APP/6.2]). An outline agreement for such works has been obtained from DCiC. The final layout of the new species-rich grassland area would be subject to further consultation with DCiC and following receptor site soil testing. The presence of suitable soil mycorrhiza is important for the establishment of orchids and so the translocation material would include a combination of soil turves containing stands of common spotted orchid *Dactylorhiza fuchsii* to supplement the main donor material which would comprise topsoil. As appropriate, the receptor area would also receive a combination of plug planting and seeding with an appropriate native species-rich grassland seed mix, as well as the incorporation of specific additional habitat features such as dead wood piles. If during the detailed design stage translocation is not deemed suitable (for example, following detailed analysis of soil testing of the receptor site), then planting of a bespoke native seed mix would be undertaken instead to achieve the same ecological outcome. Following the works, the area would be subject to appropriate habitat management and monitoring activities. To further mitigate for the loss of the A38 Roundabout LWS and grassland, strips of species-rich grassland would be established using an appropriate seed mix along the slip road verges of Kingsway junction (refer to the landscape design drawing - Figure 7.8a [TR010022/APP/6.2]).

- **Enhancing the wildlife and ecosystem function of the Scheme in adjacent designated and non-designated sites:** As detailed in para. 8.5.10, Highways England is exploring biodiversity restoration and enhancement opportunities at the Ford Lane Site of Interest, Markeaton Park LWS and Mill Ponds, which form part of Markeaton Brook System LWS (located adjacent to the Scheme). Such works may be delivered via Designated Funds and thus do not form part of the Scheme.

### **Habitats**

8.9.9 The following mitigation measures would be put in place to reduce the effects of potentially significant Scheme construction phase impacts on ecological habitats:

- **Pollution prevention control measures:** Water pollution prevention control measures and standard best practice measures to control construction dust and noise would be implemented during the construction phase via the CEMP (refer to Chapter 6: Air Quality; Chapter 9: Noise and Vibration; Chapter 13: Road Drainage and the Water Environment; and the OEMP in Appendix 2.1 [TR010022/APP/6.3]).
- **Management of invasive plant species:** Invasive plant species would be managed according to the Outline Biosecurity and Management Plan contained within the OEMP (refer to Appendix 2.1 [TR010022/APP/6.3]). Treatment and control would be undertaken by an approved specialist contractor. This would be implemented through the CEMP, thus ensuring there would be no negative impacts associated with the spread of invasive plant species during Scheme construction. The Scheme has the potential to generate a positive effect where invasive plant species are locally eradicated, including within parts of the construction compound north of Little Eaton junction.
- **Avoiding direct impact on watercourses features:** The proposed access into the main construction compound at Little Eaton junction would need to cross over the remains of the former Derby Canal (Little Eaton branch) which now comprises a watercourse adjacent to the B6179 Alfreton Road. To avoid direct effects upon the watercourse, a temporary bridge would to be used to cross the watercourse which would not require any disturbance or earthworks to the former canal. On completion of the works, the temporary bridge would be removed and the area appropriately restored (refer to Chapter 2: the Scheme, para. 2.6.101).
- **Soft-landscaping of Priority Habitats:** Areas identified within Scheme boundary for soft-landscaping would be used to contribute to the replacement of those priority habitats lost to Scheme construction specifically broadleaved woodland and species-rich semi-improved neutral grassland (refer to the landscape design drawings - Figures 7.8a - 7.8c [TR010022/APP/6.2]).
- **Selective translocation of species-rich grassland turves (from the A38 Roundabout LWS):** See mitigation for designated and non-designated sites as detailed above.

- **Species-poor grassland:** Species-poor semi-improved grassland areas within the Scheme boundary would be replaced with species-rich grassland as part of the landscape design (where highway constraints do not prevail) (refer to the landscape design drawings - Figures 7.8a - 7.8c [TR010022/APP/6.2]).
- **Loss and replacement of woodland and veteran trees:** As detailed in para. 8.9.1, the Scheme design aims to minimise the loss of woodland and trees. Where replacement planting is needed, woodland to be planted as part of the landscape design (refer to the landscape design drawings - Figures 7.8a - 7.8c [TR010022/APP/6.2]) would be native broadleaved woodland, with incorporation of a suitable high-quality flora understory, including retention of felled trees as features. In addition, the landscape design includes planting of semi-mature trees in prominent locations around the Scheme (detailed as plot type LE5.1 – individual trees on the landscape design drawings shown in Figures 7.8a to 7.8c [TR010022/APP/6.2]). Planting of semi-mature trees would shorten the time needed for such trees to develop into valuable ecological habitats.
- **Retention of felled trees as ecological feature within the landscape:** Timber from felled trees would be used to provide dead wood habitats for saproxylic (dead wood loving) species, with some placed in the understory of woodland blocks to enhance woodlands. Felled trees would be retained on site as whole boughs and trunks. Locations for such mitigation are shown on the Environmental Masterplans (refer to Figures 2.12a to 2.12h [TR010022/APP/6.2]). Also refer to the section below on bat mitigation.
- **Protection of retained trees and woodland:** Retained trees would be protected as per British Standard BS: 5837 Trees in relation to design, demolition and construction – Recommendations (BSI, 2012).
- **Habitat creation and biodiversity opportunities associated with watercourses features:** The Scheme design involves the realignment and culverting of Bramble Brook at Kingsway junction and the realignment of Dam Brook at Little Eaton junction (refer to Chapter 13: Road Drainage and the Water Environment). In undertaking these works, measures to mitigate potential WFD impacts have been included in the design (refer to Appendices 13.3A and 13.3B [TR010022/APP/6.3]), as well as ecological mitigation measures (e.g. creation of associated riparian habitat). As part of the Bramble Brook realignment works, a series of inset alternate berms would be provided within the realigned channel which would improve flow variation, help to reduce fine sediment deposition and provide suitable available habitat for in-channel macrophytes (refer to Appendix 13.3A [TR010022/APP/6.3]). In addition, specifically to mitigate WFD effects and to improve riparian habitat, it is proposed that the base of the four flood storage areas located adjacent to Bramble Brook would be kept wet (to a depth of approximately 100mm) to provide wetland habitat within the riparian corridor. Water would be delivered into the storage areas from Bramble Brook using low level piping at bed level. The system would be designed in a manner that would not cause Bramble Brook to dry out during low flow periods and prevent fauna (i.e. fish) from becoming trapped in these wetland areas.

With regard to the realignment of Dam Brook, a range of measures are being undertaken that have knock-on ecological benefits. The realigned channel design would create a more sinuous channel form within a vegetated corridor, bypassing a major weir and existing culvert (refer to Appendix 13.3B [TR010022/APP/6.3]). This would improve river connectivity and the installation of in-channel features, such as a regularly wetted berm, inset berms and point bars, would improve bed and bank structure. Where the bed of the watercourse is raised, this would encourage a more natural bed formation. The reinstatement of a natural watercourse gradient would also improve floodplain connectivity and create new wetland habitat. Further to this, backwaters (wildlife ponds) are proposed which would improve the habitat for both coarse and salmonid fish and brook lamprey. In addition, the Scheme would divert flows from an unnamed watercourse emanating from Breadsall Manor through a new flood alleviation channel planted to form a wet woodland connecting into the realigned Dam Brook. The multi-stage channel within the flood alleviation channel would provide a regularly wetted berm to encourage a more diverse macrophyte community. The drainage design at Little Eaton junction also includes two attenuation ponds for the collection and treatment of highway drainage, as well as new sections of open swale.

- **New water features:** A new highway drainage system would be installed to manage surface water as detailed in the Road Drainage Strategy (refer to Appendix 13.4 [TR010022/APP/6.3]). As part of this system, one attenuation pond would be created at Kingsway junction, with wet a sedimentation pond provided at Markeaton junction, plus two highway runoff attenuation ponds at Little Eaton junction. Such features would develop into ecological habitats. In addition, two wildlife ponds would be created as part of the Dam Brook realignment works.
- **Planting of field margins:** The Scheme would not result in loss of any notable field margins. Rank grassland has been incorporated into the landscape design (refer to the landscape design drawings - Figures 7.8a - 7.8c [TR010022/APP/6.2]), particularly adjacent to retained arable habitat linking the Scheme to the wider landscape.
- **Wildlife corridors and ecosystem functions:** The Scheme landscape design aims to maximise the use of green space within the Scheme corridor (e.g. landscaping of areas left vacant by the Scheme at the Brackensdale Avenue access onto the A38; sections of existing carriageway associated with the existing northbound A38 from Markeaton junction; the existing access from Ford Lane onto the A38; and a section of existing A38 mainline carriageway located to the north of Little Eaton junction) (refer to the Environmental Masterplans as presented in Figures 2.12a to 2.12h [TR010022/APP/6.2] and Figures 7.8a - 7.8c [TR010022/APP/6.2]). Habitat creation within the landscape design aims to enable the movement of wildlife across the Scheme into the wider landscape. This would minimise fragmentation and enable connectivity across the Scheme through: retaining areas of existing habitat where possible; creating and planting new habitats to replace those lost to construction; and enhancing new and existing habitats. This would ultimately benefit local wildlife in the long term and

assist in meeting objectives set within the LBAP and the Highways England Biodiversity Plan. Different planting regimes would also be included to accommodate changes in future climate conditions, allowing species distributions to adapt.

### **Species**

8.9.10 The following mitigation measures would be in place to reduce the effect of potentially significant Scheme construction impacts on ecological species (refer to the Environmental Masterplans in Figures 2.12a to 2.12h [TR010022/APP/6.2]):

- **Pollution prevention:** Water pollution prevention control measures and standard best practice measures to control construction dust and noise would be implemented during the construction phase via the CEMP (refer to Chapter 6: Air Quality; Chapter 9: Noise and Vibration; Chapter 13: Road Drainage and the Water Environment; and the OEMP in Appendix 2.1 [TR010022/APP/6.3]).
- **Toads:** The Scheme avoids the loss of ponds. Aquatic and terrestrial habitat creation measures incorporated within the landscape design would be of benefit for amphibians. Measures include the incorporation of ponds within the highway drainage design, two new ecology ponds at Little Eaton junction, the provision of hibernacula and log piles near new ponds to be created, and within areas of public open space and soft estate near Markeaton Lake and Mill Pond, plus the inclusion of grassland planting within the landscape design (refer to Figures 7.8a - 7.8c [TR010022/APP/6.2]).

Destructive searches of suitable refugia for toads at Markeaton junction would be undertaken during the construction phase, with collected individuals being translocated to suitable receptor sites near Markeaton Lake and Mill Ponds. Fencing would be provided at Markeaton Lake and Mill Ponds to restrict translocated toads from re-entering the working construction area.

The culvert connecting Markeaton Lake and the Mill Ponds would be retained by the Scheme, thus ensuring habitat connectivity is maintained throughout the construction phase for amphibians, and during Scheme operation. Scheme kerb design at Markeaton junction, based upon DMRB guidance, would allow amphibians to bypass gully gratings minimising the risks of them getting trapped if they did follow the kerb of the road (Highways Agency, 2001).

- **Hedgehogs:** Mixed urban planting, including shrubs, scrub, trees and grassland has been incorporated into the landscape design at Markeaton junction (refer to the landscape design drawings - Figures 7.8b [TR010022/APP/6.2]) – shrubs and scrub would provide suitable hibernacula features for hedgehogs. It is unlikely that vegetation (shrubs and scrub) removal around Markeaton junction (particularly within Markeaton Park and in the gardens of the Queensway properties to be demolished) could be undertaken outside of the hibernation period due to the need for vegetation clearance outside the nesting bird season. Clearance works would, therefore, be preceded by a hand search for hedgehogs by a suitably qualified ecologist or the ECoW.



- **Bats (roosting):** Mitigation would be in line with NE licence requirements (refer to Appendix 8.19: Letter of No Impediment for bats [TR010022/APP/6.3]; and Section 8.10 (Assessment of likely significant effects) for details).

Measures would be implemented to minimise construction impacts on bats as per Highways England guidance in IAN 116/08 (Highways Agency, 2008) e.g. buffer zones around retained roost sites and appropriate timing of works under NE EPSML where applicable.

Pre-construction surveys would be undertaken to reconfirm roost status, including those buildings at Queensway proposed for demolition which were not accessible in 2017 or 2018 (refer to para. 8.5.7). Any mitigation required would be implemented to minimise impacts in accordance with NE licence.

Other mitigation measures included within the Scheme design includes:

- Integration of bat roost features onto the 4m high noise barrier along the Scheme boundary with the Royal School for the Deaf at Markeaton junction (i.e. wooden overhang feature facing away from the road; approximately 6 no. roosting features along the barrier) (noting that the noise barrier would be installed following building demolition at Queensway and thus early in the construction phase); and bat roosting features from maternity bat roost to be lost to the Scheme (Tree M2) to be retained, translocated and strapped to a retained tree within woodland at the same height and orientation, plus the installation of an eco-rocket bat box.
- The installation of 10 bat boxes within Mackworth Park, creation of 'veteran' roost features in up to 10 mature trees within Markeaton Park and the installation of three 'totem poles' with bat roost features from felled trees to mitigate for potential roost features lost across the Scheme.
- Three bat boxes would be installed as part of the bridge extension works within the bridge abutment to create replacement roosting locations

Refer to the Environmental Masterplans as presented in Figures 2.12a to 2.12h [TR010022/APP/6.2]. Such provisions would mitigate for the loss of confirmed and potential roost sites due to Scheme construction.

- **Bats (foraging and commuting):** The Scheme design aims to minimise loss of habitat within Markeaton Park and avoid any habitat loss in association with the River Derwent, both of which are valuable hotspots for foraging and commuting bats. To compensate for habitat losses due to the Scheme, the landscape design includes the creation of habitats of value to foraging and commuting bats, using recommended plant species within the Bat Conservation Trust (BCT) Encouraging Bats Guide (BCT, 2015) and Highways England guidance in IAN 116/08 (Highways Agency, 2008). Linear habitat features, including hedgerows, have been incorporated into the landscape design (refer to the landscape design drawings - Figures 7.8a - 7.8c [TR010022/APP/6.2]) to mitigate for habitats lost and ensure ecological connectivity within and across the Scheme, and into the wider landscape.

The provision of advance planting and the phasing of vegetation clearance would aim to further reduce construction impacts on foraging and commuting bats, particularly at Little Eaton junction (as stated below for birds).

Measures would be implemented during the construction phase to minimise impacts on foraging and commuting bats – this includes keeping lighting to a minimum by limited night-time working and reducing lighting within habitats of value to bats. The main site compound to the north of Little Eaton junction would be occupied at all times for the security of the plant, equipment, and materials within it. As such, the compound would be lit as required during hours of darkness. Lighting would be directional, and positioned sympathetically, to minimise light spill.

- **Barn owl nesting sites:** Although barn owl nesting sites were not confirmed at Little Eaton junction, a pre-construction check would be undertaken by an appropriately licensed ornithologist. If found, mitigation measures would be adopted to minimise disturbance during the Scheme construction phase, such as maintaining appropriate buffer zones around nesting sites during the construction works.
- **Planting and screening to minimise impact on notable farmland birds: nesting lapwing; and wintering birds at Little Eaton:** The Scheme at Little Eaton junction aims to minimise the loss of pastoral and farmland habitat as used by notable farmland birds; and aims to avoid habitat loss of optimal lapwing nesting and wintering bird habitat (south-west of the junction in seasonally flooded pastoral land).

Replacement planting has been incorporated into the Scheme landscape design (refer to the landscape design drawings - Figures 7.8a - 7.8c [TR010022/APP/6.2]) to mitigate for grassland lost to Scheme construction at Little Eaton junction.

A dense shelterbelt of trees is included within the landscape design to the east, south and south-west of the new A38 mainline to replace habitats that would be lost. Works within this area would be finished well in advance of Scheme construction completion (e.g. towards the end of construction Phase 1 at Little Eaton junction as detailed in Chapter 2: the Scheme, Section 2.6). As such, advance planting of this shelterbelt would minimise potential disruption from traffic using the A38 on birds nesting within nearby farmland, such as yellow wagtail and skylark; and lapwing and other wading species (including teal and black-headed gull) using nearby pastoral land.

Temporary screen fencing would be provided during construction works to minimise visual disturbance to farmland birds, nesting lapwing and wintering birds. It is noted that the proposed noise and screening barriers on the southbound A38 mainline and southbound diverge slip road at Little Eaton junction would be installed following completion of the new A38 embankment and before the slip road would be used during the construction phase (e.g. during Phase 2 of the works as detailed in Illustration 2.1 in Chapter 2: The Scheme, Section 2.6). Early installation of the noise and screening barriers would further assist in minimising visual and noise disturbance to farmland birds to the east.

Bird monitoring surveys would be undertaken throughout the construction works in this area to determine the effectiveness of temporary screening.

The features associated with Dam Brook diversion at Little Eaton junction, together with the two highway drainage attenuation ponds, new ecology ponds and the flood alleviation channel planted to form a wet woodland, would benefit wintering birds.

Construction works to the north of the seasonally flooded field to the south-west of the junction would be timed where possible for the end of the summer to the early autumn (i.e. late September into October), as this was the period when no target species were recorded using the field during the 2015 and 2017 surveys. Such works are currently planned within construction Phase 1 at Little Eaton junction as detailed in Chapter 2: the Scheme, Section 2.6.

- **Little ringed plover (and oystercatcher) potential nesting sites:** The Scheme design avoids habitat loss of optimal potential little ringed plover (and oyster catcher) nesting habitat located to the south-west of Little Eaton junction. The little ringed plover species is a Schedule 1 species and is thus protected from disturbance when nesting. Should construction work in the northern part of the Alfreton Rough Grassland LWS need be undertaken during the nesting season, bird deterrents (such as shiny tape attached to canes fixed into the ground) would be implemented prior to the onset of (and during) the nesting season, in order to deter little ringed plover from nesting on the site. An ornithologist would carry out pre-construction checks to ensure that the deterrents are working and that little ringed plovers are not nesting within the field.

Advance planting of the shelterbelt which would run parallel to the south of the new A38 alignment at Little Eaton junction as described above (refer to bullet point on planting and screening to minimise impact on notable farmland birds, lapwing and wintering birds at Little Eaton junction) would screen little ringed plover (and oystercatcher) from traffic using the A38.

- **Bird foraging and nesting habitat:** Whilst the Scheme design aims to retain existing trees and vegetation within the Scheme boundary as much as possible (refer to para. 8.9.1), there would be areas of vegetation clearance at all junctions. The present shelterbelts along the A38 within Mackworth Park and the Kingsway hospital site at Kingsway junction would remain largely intact and effectively screen common nesting birds from traffic. However, sections of the shelterbelt would need to be removed to facilitate construction of an underground highway drainage tank on the edge of Mackworth Park, as well as some tree clearance at the Kingsway hospital site to gain access to flood storage areas next to Bramble Brook. Scrub habitat at the construction compound to the north of Little Eaton junction is of notable interest to breeding birds – such areas have been avoided where possible.

To mitigate for the loss of habitat of value to foraging and nesting birds across the Scheme footprint, trees and shrubs of local provenance would be planted as part of the landscape design (refer to the landscape design drawings - Figures 7.8a - 7.8c [TR010022/APP/6.2]). Such planting would provide nesting and food resources for birds, particularly for those Amber and Red List species such as song thrush and dunnock. Planting would include berry-bearing species such as hawthorn, blackthorn and elder.

In addition to landscape planting, to further mitigate for the loss of nesting habitat for some species (predominantly cavity nesters), bird nest boxes would be installed within areas of retained habitat (approximately 20 bird boxes within Mackworth Park) (refer to the Environmental Masterplan as presented in Figure 2.12a [TR010022/APP/6.2]). Such bird boxes would provide alternative nesting resources for a variety of different bird species (e.g. open-fronted and small-hole boxes).

- **Badgers:** The Scheme design avoids wherever possible the loss of badger setts, although some subsidiary and outlier setts would be lost, together with impacts upon badger foraging areas. The defined badger mitigation strategy would be implemented in line with NE licensing requirements (refer to Appendix 8.19: Letter of No Impediment for badger [TR010022/APP/6.3]); which includes exclusion of badgers from setts to be lost by installing one-way badger gates across the hole of the sett(s) and wire mesh across the surrounding area to prevent digging. Only after a period of 21 days, where all badger gates have remained secure, can it be safely assumed that badger are no longer present. The closure process would be carried out between July and November.

Pre-construction badger surveys would be undertaken in order to determine whether baseline conditions remain as detailed in Section 8.7. If any changes to badger distribution are found, then the NE licence would be updated accordingly, and mitigation measures fed into the detailed design.

Where necessary, measures would be put in place to minimise disturbance of badger setts by using appropriate buffer zones. This includes a 30m buffer zone of retained vegetation around any setts (including main setts).

The Scheme design has minimised the loss of badger foraging habitat within known badger territory ranges. However, in compiling the landscape design as detailed in Figures 7.8a - 7.8c [TR010022/APP/6.2]), appropriate planting has been incorporated into the design to account for where losses of badger foraging resources have occurred.

- **Water vole:** Although water vole was not scoped into the assessment, pre-construction surveys would be undertaken at Little Eaton junction to assess any changes in water vole distribution. It is currently assumed that water voles are not present in Dam Brook and the brook diversion works could be undertaken without the need for water vole mitigation. However, if water voles are found within Dam Brook, this would have a knock-on impact on the Scheme construction programme at Little Eaton junction (refer to Chapter 2: The Scheme, Section 2.6). As such, a precautionary mitigation strategy has been developed in relation to the Dam Brook realignment works, whilst mitigation features already included within the Scheme design at Little Eaton junction would enable strategy implementation (e.g. the creation of wildlife ponds with riparian habitat planting). An outline of this mitigation strategy is as below:
  - Creation of ecology ponds at the start of the Scheme construction phase (pre-construction works) followed by habitat planting, plus excavation of the new brook alignment.
  - Allowance for ecology pond establishment.
  - Following pond establishment, water vole trapping from Dam Brook followed by habitat clearance, with any captured water vole transferred to the ecology ponds (which would be appropriately fenced to protect them from the works).
  - Diversion of Dam Brook into new alignment, with associated habitat creation.
  - Release of water vole into realigned Dam Brook when appropriate.

Given the above, it is apparent that should water vole be found in Dam Brook during pre-construction surveys, the mitigation strategy as detailed above has the potential to delay some construction works by several months.

- **Otter:** Otters (foraging and commuting) are present (or assumed to be present) on all watercourses surveyed within 250m of the Scheme. Thus, works to Bramble Brook and Dam Brook would result in the loss of otter habitat. Such habitat losses would be mitigated for through the appropriate realignment design of these watercourses which includes replacement habitat of benefit to riparian mammals.

Pre-construction surveys would be undertaken to establish any change in otter distribution and any new holt sites. Any changes identified could thus be considered in order to minimise potential risks of harm to otter during the works.

Water pollution prevention control measures and standard best practice measures to control construction dust and noise would be implemented during the construction phase via the CEMP (refer to Chapter 6: Air Quality; Chapter 9: Noise and Vibration; Chapter 13: Road Drainage and the Water Environment; and the OEMP in Appendix 2.1 [TR010022/APP/6.3]).

Measures to minimise noise, vibration and lighting disturbance (refer to Chapter 6: Air Quality; Chapter 9: Noise and Vibration) to dispersing otter within and directly adjacent to the Scheme would be implemented during the construction phase via the CEMP (refer to the OEMP in Appendix 2.1 [TR010022/APP/6.3]). Potential otter dispersal corridors would also be maintained with the new Dam Brook channel created ahead of closure of the existing channel. Standard water pollution prevention controls (refer to Chapter 13: Road Drainage and the Water Environment) would also be implemented via the CEMP to minimise any potential impact on otter food source.

- **Terrestrial invertebrates:** The loss of species-rich grassland due to the Scheme would impact upon terrestrial invertebrates. Thus, the mitigation proposed for the loss of species-rich grassland as detailed herein would provide mitigation for terrestrial invertebrates. This includes the translocation of soils from the A38 Roundabout LWS within Kingsway junction into Markeaton Park to create a new species-rich grassland area within the park (refer to para. 8.9.8) and planting of species-rich grassland habitat would also mitigate for loss of habitat for terrestrial invertebrate species.

In addition to the above, the plant species selected within the landscape design takes into account notable terrestrial invertebrate species (refer to the landscape design drawings - Figures 7.8a - 7.8c [TR010022/APP/6.2]). For example, the landscape design incorporates disease resistant elms near Markeaton Park and Mackworth Park, which aims to assist the continued survival of white-letter hairstreak butterfly (although this species was not recorded during surveys, this butterfly is known in the area - refer to Table 8.8).

Other measures included within the Scheme design that mitigate impacts upon terrestrial invertebrates includes: strips of species-rich grassland would be established using an appropriate seed mix along the slip road verges of Kingsway junction, provision of log piles around ponds and within the species-rich grassland area at Markeaton Park, retention of some felled trees on site as whole boughs and trunks at Markeaton Park (refer to the Environmental Masterplans as presented in Figures 2.12a to 2.12h [TR010022/APP/6.2]).

- **Aquatic invertebrates:** Water pollution prevention control measures and standard best practice measures to control construction dust would be implemented via the CEMP (refer to Chapter 6: Air Quality; Chapter 13: Road Drainage and the Water Environment; and the OEMP in Appendix 2.1 [TR010022/APP/6.3]) – such measures would protect watercourses near the Scheme and associated aquatic invertebrates.

The Scheme design includes a highway drainage system (refer to the Road Drainage Strategy in Appendix 13.4 [TR010022/APP/6.3]). As part of this system, one attenuation pond would be created at Kingsway junction, with a wet sedimentation pond provided at Markeaton junction, plus two highway runoff attenuation ponds at Little Eaton junction. Such features would develop into ecological habitats of benefit to aquatic macroinvertebrates. In addition, habitat creation associated with the Bramble Brook and Dam Brook

realignment works include a range of measures to meet the objectives of the WFD (refer to para. 8.9.9 bullet point on habitat creation and biodiversity opportunities associated with watercourses features) – such measures would also be of benefit to aquatic invertebrates.

- **Fish:** Water pollution prevention control measures and standard best practice measures to control construction dust would be implemented via the CEMP (refer to Chapter 6: Air Quality; Chapter 13: Road Drainage and the Water Environment; and the OEMP in Appendix 2.1 [TR010022/APP/6.3]) – such measures would protect watercourses near the Scheme and associated fish.

The flood storage areas at Kingsway junction associated with Bramble Brook would be designed to prevent fish from becoming trapped in these new wetland areas.

The new channel for the Dam Brook realignment would be created offline, with water then being diverted into the new channel from the existing channel. Prior to the diversion works, the existing channel would be electro-fished to ensure that all fish are removed before the channel is drained and connected to the new channel. The old channel would then be hand-searched and selective areas of silt sieved to locate any remaining ammocoetes (young brook lamprey) are not left stranded. Any brook lamprey, three-spined stickleback and stone loach found in the old channel would be moved to a suitable receptor site downstream on Watermeadows Ditch (within the Scheme boundary). Brown trout, bullhead and perch collected would be translocated to the River Derwent (within the Scheme boundary) (as the Watermeadows Ditch was considered unsuitable for these species due to poor habitat suitability and water quality).

The proposed wildlife ponds located near the new Dam Brook channel have been designed to provide suitable habitat for fish. The ponds would have a downstream connection to Dam Brook to enable success of created habitat in the long term; providing fish refugia and a route for fish to enter and exit in a flood event or if the ponds are drying out.

- **Control of the spread of crayfish plague:** Markeaton Brook, including downstream of Markeaton Lake, Dam Brook and Watermeadows Ditch, are potentially carrying crayfish plague spores. Any machinery and equipment used in these waterbodies (including excavators, pumps, waders, traps and nets, personal protective equipment) has the potential to transfer these spores if they are then used in other waterbodies and watercourses. As such, any machinery or other equipment used in Markeaton Brook would be thoroughly cleaned in accordance with a biosecurity protocol before use in other waterbodies to minimise the spread of crayfish plague spores (refer to the Outline Biosecurity and Management Plan within the OEMP in Appendix 2.1 [TR010022/APP/6.3]). If material must be excavated from any watercourse with signal crayfish, there is the potential for movement of crayfish in excavated spoil, so additional biosecurity measures would be necessary if excavated material from the watercourse has to be transported to another location. It could only be transferred from site to a controlled waste site via licence.

## Operation

### *Designated, non-designated sites and habitats*

8.9.11 The following mitigation measures would be in place to reduce the effect of potentially significant Scheme operational impacts on designated, non-designated sites and habitats:

- **Management of operational highway run-off:** Highway runoff from the operational Scheme runoff would be collected and managed in accordance with the Road Drainage Strategy (Appendix 13.4 [TR010022/APP/6.3] – also refer to Chapter 13: Road Drainage and the Water Environment).
- **Road treatments of salt spray:** Discussions with East Midlands Asset Delivery team (Highways England) indicates that the de-icing agents used on the network are sodium chloride (NaCl) and sodium chloride brine. Such de-icing agents are already used on the A38 and the surrounding strategic highway network. De-icing operations on the Scheme would be undertaken in accordance with standard highway maintenance practice, with residual salt residues within highway runoff being collected by the highway drainage system.

### *Species*

8.9.12 The following mitigation measures would be in place to reduce the effect of potentially significant Scheme operational impacts on ecological species:

- **Shelterbelt to protect birds (farmland and wading birds):** A dense shelterbelt and hedgerows would be planted along the southern and eastern edges of the new A38 alignment at Little Eaton junction to screen bird species (such as lapwing, little ringed plover, oystercatcher yellow wagtail, linnet, reed bunting, skylark and yellowhammer) which are (or likely to be) nesting in the surrounding habitats from road traffic using the Scheme. This shelterbelt would also help screen birds such as lapwing, little ringed plover and oystercatcher using the pastures at Alfreton Grassland LWS from road traffic disturbance. These shelterbelts, in combination with the noise and screening barriers to be located along sections of the Scheme at Little Eaton junction (refer to the Environmental Masterplans as presented in Figures 2.12e to 2.12g [TR010022/APP/6.2]), would also mean that any birds that want to cross the Scheme are encouraged to increase their flight height across the road and thus reduce the risk of road traffic collision. Such measures are anticipated to reduce the potential for barn owl mortalities resulting from collisions with road vehicles as barn owl is known to be present in the area around Little Eaton junction.
- **Bats (roosting, foraging and commuting):** The Scheme lighting has been designed to minimise impacts on bats. Approximately 12m to 15m high columns with light-emitting diode (LED) luminaires would be used at Kingsway junction and Markeaton junction which would tie in with existing lighting outside the Scheme boundary, as applicable. Such LED lighting reduces light spill into adjacent areas, whilst LED lights (with directional and narrow beam) emit warm white lighting rather than the yellow and orange colour which is more commonly emitted by conventional lighting which would reduce impacts upon bats. In addition, at Little Eaton junction 12m high



columns with LED luminaires would be provided at the new at-grade roundabout and the approaching slip-roads, although the A38 mainline through the junction would be unlit to minimise visual intrusion. These lighting proposals have been reviewed against the guidance provided by IAN 116/08 (Highways Agency, 2008) and by the Institute of Lighting (2018) regarding minimising lighting risks to bats. It is considered that the lighting strategy would minimise impacts on foraging, commuting and roosting bats given the use of LED luminaires, with lighting being directed to where it is needed to minimise horizontal light spillage, whilst upward lighting would be minimal. In addition, there would be no illumination of any roost entrances and associated flightpaths or on habitats and features with known bat activity hot spots (which includes Mackworth Park, Markeaton Park and Markeaton footbridge, the River Derwent (north and south of the A38; in association with the A38 Scrub Other Site of Interest), and to the north of B2 Flood Arch Bridge).

Planting of linear features and other habitats included within the landscape design (as detailed in Figures 7.8a - 7.8c [TR010022/APP/6.2]) would mitigate for that lost due to the Scheme and would replace and reinstate navigational cues. Careful design of the landscaping at known bat activity hot spots and flyways has been undertaken - this has included planting to encourage bats towards the existing farm access track and flood arch underpass at Little Eaton junction, and heavy standard interspersed tree planting at Markeaton junction where bats are known to cross the A38. In addition, the replacement of Markeaton footbridge would maintain a navigational cue for bats across the A38.

- **Badger fencing:** Badger fencing would be installed to prevent badger access onto the new A38 mainline (refer to the Environmental Masterplans as presented in Figure 2.12a/b and Figures 2.12e to 2.12g [TR010022/APP/6.2]). Effective fencing would be beneficial to the local badger population conservation status as well as users of the road by avoiding collision with badgers trying to cross the road.
- **Otter, aquatic invertebrates and fish:** Highway runoff from the operational Scheme runoff would be collected and managed in accordance with the Road Drainage Strategy (Appendix 13.4 [TR010022/APP/6.3] – also refer to Chapter 13: Road Drainage and the Water Environment). Such measures would manage the quantity and quality of highway runoff to the benefit of otter and all aquatic species.

## 8.10 Assessment of likely significant effects

- 8.10.1 The following section assesses the effects on ecological features scoped into the assessment (refer to Section 8.7) resulting from the impacts of construction and operation of the Scheme. The assessment takes into account the environmental design measures embedded in the Scheme design as well as the management actions as detailed in Section 8.9. Conclusions are made on likely significant residual effects, negative (adverse) and positive (beneficial), as well as non-significant effects (where applicable) based on biodiversity assessment methodology (refer to Table 8.4). Reference is made to potential enhancement measures; however, these have not been factored into the determination of

residual effects (where applicable).

- 8.10.2 Refer to Figures 8.3 to 8.36 [TR010022/APP/6.2] for the details regarding the location of ecological features discussed in this section (where applicable).

### **Construction effects**

#### ***International designated sites***

- 8.10.3 There would be no direct or indirect impacts on European designated sites during construction of the Scheme. NE screening consultation has confirmed that they are satisfied with the conclusion of no likely significant effect on European sites namely: Gang Mine SAC, Bees Nest and Green Clay Pits SAC, Peak District SAC, South Pennine Moors SAC and SPA, River Mease SAC, and the West Midlands Mosses SAC and Ramsar. As such, the Scheme would have a non-significant (neutral) effects upon European designated sites. The confidence in this prediction is certain/near-certain. Refer to Appendix 8.2: Habitat Regulations Assessment – No Significant Effects Report [TR010022/APP/6.3] for details.

#### ***National and local statutory designated sites***

##### *Direct effects - habitat loss*

- 8.10.4 There would be no direct construction impacts on national or local statutory designated sites given that there are no national or local statutory designated sites located within or directly adjacent to the Scheme boundary.

##### *Indirect effects - disturbance through surface runoff, dust and noise from construction*

- 8.10.5 Kedleston Park SSSI (designated for its deadwood and terrestrial invertebrate assemblage) is located approximately 1.9km north-west of the Scheme boundary at Markeaton junction. The SSSI is connected to the Scheme via Markeaton Brook. However, the SSSI is located upstream of the proposed construction works and thus would not be affected by the Scheme.
- 8.10.6 Mickleover Meadows LNR (designated for its diverse habitat mosaic) has hydrological links to the Scheme via Mickleover Railway cutting LWS. However, the LNR is located upstream of the proposed construction works and thus would not be affected by the Scheme.
- 8.10.7 Darley and Nutwood LNR (designated for its habitats and ancient woodland) is hydrologically linked downstream of the Scheme via the River Derwent at Little Eaton junction. However, given the implementation of standard water pollution prevention control measures (refer to Section 8.9), the site is not anticipated to be affected during the Scheme construction phase.
- 8.10.8 None of the other national and local statutory designated sites located within 2km of the Scheme (Breadsall Railway Cutting SSSI and LNR; Allestree Park LNR; Breadsall Railway Cutting LNR; and Chaddesden Woods and Lime Lane Wood LNR) have hydrological or habitat links to the Scheme and thus would not be affected by Scheme construction due to water pollution effects.

- 8.10.9 None of the national and local statutory designated sites located within 2km of the Scheme have qualifying features sensitive to noise disturbance. Additionally, all national and local statutory designated sites are located >200m from the Scheme (excluding the locations remote from the Scheme where there would be minor signage works and associated road restraint systems within the existing highway verges) and are therefore not anticipated to be affected by changes in air quality or dust emissions during the Scheme construction phase.
- 8.10.10 Given the implementation of standard pollution prevention control measures and best practice measure to control dust (as detailed in Section 8.9), it is considered that there would be a non-significant (neutral) effect on national and local statutory designated sites from disturbance by Scheme construction activities. The confidence in this prediction is certain/near-certain.

*Indirect effects- habitat fragmentation, enhancing habitat connectivity of Mickleover Meadows LNR*

- 8.10.11 There are habitat links from Mickleover Meadows LNR to the Scheme via the Mickleover Railway cutting LWS. Construction of the Scheme would not result in any habitat fragmentation indirectly affecting this LNR.
- 8.10.12 The use of Mackworth Park for mitigation for bats and birds (as detailed in Section 8.9) has the potential to tie in with the Mickleover Meadows LNR extension proposals being led by DCiC. However, this potential beneficial effect has not been considered as part of the assessment of residual effects.

***Local non-statutory designated sites***

*Direct effects - habitat loss*

- 8.10.13 The Scheme would result in the permanent direct loss of 100% (approximately 3.8ha) of the A38 Roundabout LWS at Kingsway junction. The area of semi-improved species rich grassland habitat, which the LWS is designated for, accounts for approximately 7% of the A38 Roundabout LWS (approximately 0.28ha out of a total area of approximately 3.8ha). Although mitigation would be provided for the loss of these habitats (including approximately 0.28ha of species-rich grassland within Markeaton Park through suitable translocation and planting and seeding), a permanent negative effect on the functional integrity of the LWS would remain due to permanent loss of the LWS. There would, therefore, be a moderate adverse significant effect (at the County or Unitary Authority scale) on the A38 Roundabout LWS prior to and post implementation of defined mitigation measures. The confidence in this prediction is certain/near certain. The timing of habitat loss would consider impacts upon other ecological species, particularly nesting-birds and terrestrial invertebrates (as detailed further in this section).
- 8.10.14 The Scheme would result in the temporary loss of approximately 1% (approximately 0.93ha) of Markeaton Park LWS at Markeaton junction. This area would be reinstated and landscaped post-construction. No veteran trees, which the site is designated for, would be lost through construction of the Scheme. The functional integrity of the site would, therefore, not be affected by the relatively small area which would be permanently lost and given that no veteran trees would be removed. Therefore, it is considered that there would be a non-significant (neutral) effect on Markeaton Park LWS from habitat loss. The

confidence in this prediction is certain/near certain. The timing of habitat loss would consider impacts upon other ecological species, particularly nesting-birds and bats (as detailed further in this section).

- 8.10.15 The Scheme would result in the permanent loss of approximately 30% (approximately 1.23ha) of Alfreton Road Rough Grassland LWS at Little Eaton junction. In addition, approximately 20% (approximately 0.86ha) of Alfreton Road Rough Grassland LWS would be temporarily impacted during the Scheme construction phase, but would be reinstated through suitable landscape planting post-construction. The LWS is designated for its floodplain semi-improved grassland habitat; however, it is dominated by New Zealand pigmyweed (invasive plant under Schedule 9 of the Wildlife and Countryside Act 1981) which is currently affecting its intrinsic biodiversity value. The functional integrity of this site is not considered to be affected due to the relatively small area to be permanently lost due to the Scheme. The area of most biodiversity interest (botanically and for ornithology) is the inundation area/drawdown zone which would remain unaffected by the construction works. Therefore, it is considered that there would be a non-significant (neutral) effect on Alfreton Road Rough Grassland LWS from habitat loss. The confidence in this prediction is certain/near-certain. The timing of habitat loss would consider impacts upon other ecological species, particularly nesting-birds and wintering birds (as detailed further in this section).
- 8.10.16 There would be no direct impacts (habitat loss) on any other local non-statutory designated sites near the Scheme.
- 8.10.17 As detailed in para. 8.5.10, there is potential for ecological restoration and aspirational enhancement of Markeaton Park LWS and Mill Ponds (which form part of the Markeaton Brook System LWS) which may be delivered as part of a Designated Fund project. However, this potential beneficial enhancement effect has not been considered as part of the assessment of residual effects.

*Indirect effects - disturbance through surface runoff, dust and noise from construction*

- 8.10.18 Bramble Brook and Margins LWS, Markeaton Brook System LWS, Mickleover Railway Cutting LWS, the River Derwent LWS and Alfreton Road Grassland LWS are all located adjacent to the Scheme boundary and thus susceptible to pollution from surface run-off during the Scheme construction phase. The Scheme site also has hydrological links downstream to the Watermeadows Ditch LWS (approximately 0.4km south of the Scheme boundary at Little Eaton junction via Dam Brook and the Watermeadows Ditch watercourse); Nooney's pond LWS (approximately 0.7km south of the Scheme boundary at Little Eaton junction via Watermeadows Ditch); Darley and Nutwood LWS (approximately 0.15km to the south of the Scheme boundary at Little Eaton junction via the River Derwent); and Darley Park LWS (approximately 0.7km south of the Scheme via the River Derwent). Water pollution prevention control measures would, however, be in place as detailed in Section 8.9 to avoid potential impacts on these sites located adjacent to and downstream of the Scheme. Similarly, Section 8.9 indicates that standard best practice measures to control dust would be put in place to avoid potential construction dust impacts upon those sites located adjacent to the Scheme boundary and within 200m.

- 8.10.19 Chaddesdon Wood and Lime Lane Wood LWS and Allestree Park LWS were scoped into the assessment due to their overlapping designation with statutory designated sites (Chaddesden Woods and Lime Lane Wood LNR and Allestree Park LNR respectively). However, they are noted to have no hydrological or habitat links to the Scheme (see above).
- 8.10.20 None of the sites scoped into the assessment have qualifying features noted in their designation to be sensitive to noise disturbance. However, noise impacts upon protected and notable species identified at these sites, including ornithological interest at Alfreton Road Grassland LWS and bats at Markeaton Park LWS, are considered in the species sections below.
- 8.10.21 Given the implementation of standard pollution prevention control measures and best practice measures to control dust, it is considered that there would be a non-significant (neutral) effect on local non-statutory designated sites from disturbance by construction activities. The confidence in this prediction is certain/near-certain.

***Non-designated sites***

*Direct effects - habitat loss*

- 8.10.22 The A38 Scrub DE05.03 Other Site of Interest is located within the Scheme boundary at Little Eaton junction, south of the A38 and west of the River Derwent. Approximately 0.17ha (approximately 13%) of this site would be temporarily impacted during the Scheme construction phase due to the need to provide an access route to the proposed floodplain compensation area. The botanical survey in 2017 did not identify any characteristic woodland flora or notable botanical interest within the site. The habitat lost would be temporary, as the area affected would be restored and landscaped post-construction. It is considered that the functional integrity of the site of interest would remain during and post construction. Therefore, it is considered that there would be a non-significant (neutral) effect on the A38 Scrub DE05.03 Site of Interest from habitat loss during the Scheme construction phase. The confidence in this prediction is certain/near certain. The timing of habitat loss would consider impacts upon other ecological species, particularly nesting-birds and bats (as detailed further in this section).
- 8.10.23 There would be no direct impacts (habitat loss) on any other non-designated sites near the Scheme.
- 8.10.24 As detailed in Section 8.5.10, there is potential for ecological restoration and aspirational enhancement of an area of public open space off Ford Lane which may be delivered as part of a Designated Fund project. However, this potential beneficial enhancement effect has not been considered as part of the assessment of residual effects.

*Indirect effects - disturbance through surface runoff, dust and noise from construction*

- 8.10.25 Land off Kingsway PLWS is located within 200m of the Scheme boundary at Kingsway junction, whilst the A38 Scrub, Ford Lane, Des Lane Brook Course, Plantation, Boosemoor Brook and Old Derby Canal are all located within or adjacent to the Scheme boundary at Little Eaton junction. Holme Nook Ponds and Haslam Lane Brook course are located downstream of the Scheme at Little

Eaton junction (>200m). All these sites are susceptible to potential disturbance through accidental pollution of surface runoff and dust from Scheme construction activities.

- 8.10.26 As detailed in Section 8.9, standard water pollution prevention control measures would be in place to avoid potential impacts upon these sites located adjacent to and downstream of the Scheme. In addition, best practice measures to control dust would also be implemented to avoid potential impacts during construction on these sites located adjacent to the Scheme boundary and those within 200m.
- 8.10.27 None of the sites scoped into the assessment have qualifying features noted in their designation to be sensitive to noise disturbance. However, noise impacts upon protected and notable species identified at these sites during dedicated surveys, including otters at Boosemoor Brook and bats at the A38 Scrub, are considered in the species sections below.
- 8.10.28 Given the implementation of standard pollution prevention control measures and best practice measures to control dust, it is considered that there would be no significant (neutral) effect on non-designated sites from disturbance by construction activities. The confidence in this prediction is certain/near certain.

### **Habitats**

#### *Direct effects - habitat loss from vegetation clearance*

- 8.10.29 Table 8.15 shows the approximate areas and lengths of habitat lost in association with land take required permanently and temporarily for the Scheme, as well as the area and lengths of habitat to be landscaped or re-instated within the Scheme boundary.
- 8.10.30 Figures 7.8a - 7.8c [TR010022/APP/6.2] shows the landscape design, which includes details of planting proposals for areas subject to permanent and temporary land take due to the Scheme.

**Table 8.15: Approximate habitat losses and gains associated with the Scheme**

Habitat	Habitat type (from Phase 1 habitat survey Figures 8.6, 8.7 and 8.8) [TR010022/APP/6.2]	Importance of ecological feature	Habitat loss (hectares ha/ No.) (approx.)	New habitat (from Landscape Figures 7.8a to 7.8c and Environmental Masterplans in Figures 2.12a to 2.12h) [TR010022/APP/6.2]	Habitat gain (approx.)	Net permanent habitat gain (Gain – Loss) (approx.)	Notes (See Chapter text for details)
Grassland	Semi-improved neutral grassland – species rich	County or Unitary Authority	1.48	LE1.3 - Proposed Species Rich Grassland (Comprising translocated grassland from the A38 Kingsway Roundabout LWS (approximately 0.28ha); replacement planting within the reinstated construction compound and new grassland on road verges/central reservation (approximately 8.61ha))	8.89ha	+7.41ha	There would be a net gain of 7.41 hectares of species-rich grassland. Species-poor and marshy grassland lost during construction would be replaced with species rich grassland.
	Semi-improved grassland (including poor semi-improved grassland)	Local	3.97ha	(See LE1.3 - priority habitat replacement above)	(See above)	-3.97ha	
	Marshy grassland	Local	0.74ha	(See LE1.3 - priority habitat replacement above)	(See above)	-0.74ha	
Trees	Veteran trees across the Scheme	Up to County or Unitary Authority	1 No. (M36/T358)	Not applicable. Veteran trees are irreplaceable.	-	-1 No. (M36/T358)	One veteran tree would be permanently lost for construction of Markeaton footbridge.
Woodland	Semi-natural broadleaved woodland	Up to County or Unitary Authority	0.82ha	LE2.1 - Proposed Woodland Mix (landscape)	6.40ha	-4.98ha	There would be a net loss of 4.98ha of woodland primarily of local value. However, the woodland lost during construction would aim to be replaced with woodland of higher quality in the long term.
	Mixed plantation woodland, broadleaved plantation and/or coniferous plantation.	Local	10.56ha				
	Sub-total woodland:		11.38ha				
Standing Water	Ponds	County or Unitary Authority	None	LE61 Waterbodies and associated planting (landscape)	6 No.	+6 No.	There would be a net gain of ponds with creation of; one attenuation pond at Kingsway junction, a wet sedimentation pond at Markeaton junction; two highway runoff attenuation ponds at Little Eaton junction; and two new ecology ponds at Little Eaton junction as part of the realignment of Dam Brook.
Arable/Pasture	Arable (incl. field margins)	Local	1.82ha	Land returned to unrestricted agricultural use (arable or improved)	9.38ha	-1.99ha	83% of the arable/pasture land lost during construction would be reinstated. However, there would be some permanent loss at Little Eaton junction.
	Improved grassland	Site	9.4ha				
	Sub-total arable/pasture:		11.37ha				

Habitat	Habitat type (from Phase 1 habitat survey Figures 8.6, 8.7 and 8.8) [TR010022/APP/6.2]	Importance of ecological feature	Habitat loss (hectares ha/ No.) (approx.)	New habitat (from Landscape Figures 7.8a to 7.8c and Environmental Masterplans in Figures 2.12a to 2.12h) [TR010022/APP/6.2]	Habitat gain (approx.)	Net permanent habitat gain (Gain – Loss) (approx.)	Notes (See Chapter text for details)
Other habitats	Amenity grassland	Site	5.94ha	LE1.1 Amenity Grassland (See LE2.6 – for mitigation of lost gardens)	9.71ha	+3.77ha	There would be a net gain in amenity grassland. The Scheme design is restricted in places to use of amenity grassland only; in terms of driver visibility splays and management.
	Scattered and dense scrub	Site	1.44ha	LE2.4 - Shrubs with trees (landscape)	0.36ha	+0.74ha	There would be a net gain in scrub/shrubs. Scattered and dense scrub to be lost would be compensated for with planting of native shrubs.
				LE2.6 - Proposed Native Shrubs (landscape) incl. Public Open Space	1.82ha		
				Sub-total shrubs:	2.18ha		
	Scattered trees	Site	Not calculated, see Landscape Figures 7.8a to 7.8c [TR010022/APP/6.2], and Environmental Masterplan Figures 2.12a to 2.12h [TR010022/APP/6.2] for locations	LE2.7 Scattered trees and LE5.1 Individual trees	Numbers to be included on detailed planting plans.	N/A	Trees to be planted would compensate for those lost, with numbers to be confirmed on the detailed planting plan.
	Introduced shrubs	Site	-	(See LE1.3, LE2.4 and LE2.6)	-	-	No loss of introduced shrubs.
	Tall ruderal	Site	0.63ha	(See LE1.3, LE2.4 and LE2.6)	-	-0.63ha	There would be a net loss of tall ruderal habitat of site value; however, this would be replaced with higher value species-rich habitat and compensated for with species-rich grassland, native shrubs and trees.
Hard standing, bare ground, buildings	Site	15.54ha	New road alignment and other areas of hard-standing	22.31ha	+6.77ha	The new road requires some permanent land take at Kingsway and Markeaton junction for the extra road lane; and permanent land take at Little Eaton junction where the Scheme goes offline.	
Invasive non-native plant species	Site	1.17ha	Not applicable.	-	-1.17ha	The eradication and management of invasive plant species within the construction area would provide a net gain to biodiversity.	
Running water	Bramble Brook	County or Unitary Authority	161m	Enhancement of existing channel	-	-161m	The existing Bramble Brook is of poor quality. A series of inset alternate berms within the realigned channel and the creation of wetland habitat within four flood storage areas would mitigate for loss of open channel.
	Dam Brook	County or Unitary Authority	279m	LE6.1 Waterbody and wetland LE6.2 Banks and ditches	476m	+197m	The Dam Brook realignment would result in a net gain of open channel of better quality.
	Other watercourses	County or Unitary Authority	None	-	-	-	-



Habitat	Habitat type (from Phase 1 habitat survey Figures 8.6, 8.7 and 8.8) [TR010022/APP/6.2]	Importance of ecological feature	Habitat loss (hectares ha/ No.) (approx.)	New habitat (from Landscape Figures 7.8a to 7.8c and Environmental Masterplans in Figures 2.12a to 2.12h) [TR010022/APP/6.2]	Habitat gain (approx.)	Net permanent habitat gain (Gain – Loss) (approx.)	Notes (See Chapter text for details)
Hedgerows	Intact species poor hedgerow	Local	509m	LE4.4 Native hedgerow with trees - species-rich (landscape)	107m	-402m	Although there would be a net loss (in length) of hedgerow; the hedgerows to be planted by the Scheme would be of higher quality.
	Defunct species-poor hedgerow	Local	0m				
	Species-poor hedgerow with trees	Local	0m				
	Sub-total hedgerow:		509m				

### Grassland

- 8.10.31 The species-rich semi-improved grassland within the A38 Roundabout LWS (approximately 0.28ha) would be permanently lost due to the Scheme (as stated within the section on local non-statutory designated sites above). The loss of this grassland would result in a moderate adverse significant effect (at the County or Unitary Authority scale) without mitigation. However, mitigation would be provided by the creation of new species-rich grassland (approximately 0.28ha) within Markeaton Park through suitable translocation and planting and seeding to replace the habitats lost.
- 8.10.32 Species-rich semi-improved grassland would also occur within the construction compound site to the north of Little Eaton junction – use of the site as a construction compound would result in the loss of approximately 1.2ha of species-rich semi-improved grassland. Marshy grassland within the proposed construction compound would also be lost. However, following completion of the construction works, this site would be subject to re-instatement with species-rich grassland to pre-existing conditions post construction.
- 8.10.33 Additional species-rich grassland planting, to mitigate for the loss of species-poor grassland lost due to the Scheme, has been incorporated into the landscape design. This includes areas of species-rich grassland at all three junctions - refer to the landscape drawings Figures 7.8a - 7.8c [TR010022/APP/6.2] for details.
- 8.10.34 With the provision of the mitigation measures as detailed above and in Section 8.9, it is considered that there would be a non-significant (neutral) effect on grassland from habitat loss to construction activities. The confidence in this prediction is probable. The timing of habitat loss would consider impacts upon other ecological species, particularly nesting-birds and terrestrial invertebrates (as detailed further in this section).

### Veteran trees

- 8.10.35 As detailed in Section 8.9, the Scheme design has aimed to avoid the loss of veteran trees that are located within the Scheme boundary, including avoiding the loss of veteran trees within Markeaton Park LWS, the veteran trees to the north of the floodplain compensation area and the veteran tree in the field immediately south of Little Eaton junction. Whilst this has been possible in most cases, one veteran tree located adjacent to the existing Markeaton footbridge would be lost during works to demolish the footbridge and install the replacement footbridge. Due to the tree's proximity to the existing and new footbridge, tree loss would be unavoidable. The loss of this veteran tree would be a slight non-significant adverse effect (at the Local scale). Loss of the veteran tree cannot be mitigated, although it is noted that the landscape design includes considerable tree planting across all three junctions. In addition, the veteran tree (with its potential bat roost features) would be made into a totem pole feature and installed at the edge of Markeaton Park as part of the bat mitigation strategy (refer to Environmental Masterplan illustrated in Figure 2.12c/d [TR010022/APP/6.2]).

8.10.36 It is considered that the loss of the veteran tree is a slight adverse non-significant effect (at the Local scale). The confidence in this prediction is certain/near-certain. The timing of habitat loss would consider impacts upon other ecological species, particularly bats (the veteran tree to be lost has a confirmed bat roost) and nesting-birds (as detailed further in this section).

#### Woodland

8.10.37 Scheme construction would result in the loss of approximately 11.38ha of woodland (refer to Table 8.15) – this includes woodland areas within the A38 Kingsway Roundabout LWS and central reservation, edge of Markeaton Park, A38 Scrub Other Site of Interest at Little Eaton, and immediately to the south and east of the A38 at Little Eaton junction where the Scheme goes offline.

8.10.38 Given these losses, there would be a moderate adverse significant effect (at the County or Unitary Authority scale) on semi-natural broadleaved woodland and slight adverse non-significant effect (at the Local scale) on mixed plantation woodland, broadleaved plantation and coniferous plantation in the short to medium term<sup>28</sup> during construction until replacement habitat establishes. However, given the mitigation proposed to replace all woodland habitats lost with native broadleaved woodland (approximately 6.4ha) (refer to the landscape drawings in Figures 7.8a - 7.8c for details [TR010022/APP/6.2]), including a suitable ground flora and incorporation of dead woodpiles (from trees felled), there is considered to be a non-significant (neutral) effect on all woodland in the long-term. The confidence in this prediction is probable. The timing of habitat loss would consider impacts upon other ecological species, particularly nesting-birds, bats and hedgehogs (as detailed further in this section).

#### Ponds

8.10.39 There is one pond within the Scheme boundary at Little Eaton junction (Pb5). There would be works in the pond area regarding drainage connections, however, the pond would be retained and not lost as part of construction activities. Therefore, it is considered that there would be no significant (neutral) effect on ponds.

8.10.40 As detailed in Section 8.9, the Scheme design incorporates a highway drainage system that includes one attenuation pond at Kingsway junction, a wet sedimentation pond at Markeaton junction, plus two highway runoff attenuation ponds at Little Eaton junction. In addition, the Scheme would provide two new ecology ponds at Little Eaton junction as part of the realignment of Dam Brook. As a result, there would be a slight beneficial non-significant effect (at the Local scale) given the pond measures (habitat gains) proposed. Confidence in this prediction is probable.

#### Running water (watercourses)

8.10.41 The Scheme would have a direct impact on Bramble Brook at Kingsway junction and direct impacts to Dam Brook at Little Eaton junction (including an ephemeral unnamed tributary of the Dam Brook which rises upstream of the A38 near Breadsall Manor - refer to Chapter 13: Road Drainage and the Water Environment).

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<sup>28</sup> 'Short term' for woodland is considered to be in the region of 5 to 10 years; 'medium term' 10 to 15 years; and 'long term' >15 years.

- 8.10.42 Bramble Brook currently has poor habitat quality with bed sediments dominated by silt and reinforced and heavily shaded banks reducing macrophyte value. The channel and some of its tributaries have no perceptible flow in places and limited flow variation. The Scheme would require Bramble Brook to be realigned through Kingsway junction, with a section of open channel being put into culvert – culverting would result in the loss of approximately 131m of open channel within the junction. There would also be an approximate 30m extension of the existing culvert under the southbound A38 carriageway to the west of the junction. To mitigate for the loss of open channel and resultant WFD impacts, the Scheme design includes the following measures (refer to para. 8.9.9 bullet point on habitat creation and biodiversity opportunities associated with watercourse features): a series of inset alternate berms within the realigned channel and the creation of wetland habitat within four flood storage areas (also refer to Kingsway junction WFD Assessment Report provided in Appendix 13.3A [TR010022/APP/6.3]). Considering the existing available poor habitat within Bramble Brook, there would be a slight adverse non-significant effect (at the Local scale) on Bramble Brook in the short-term during construction, until the habitats within the retained and realigned Bramble Brook channel and the flood storage areas have established. However, with the mitigation proposed and the existing poor-quality habitat of Bramble Brook within the junction, there would be a nonsignificant (neutral) effect on Bramble Brook in the medium to long-term. The confidence in this prediction is probable. The timing of habitat loss would consider impacts upon other ecological species, particularly for otter (as detailed further in this section).
- 8.10.43 Construction of the embankment at Little Eaton junction would require the realignment of Dam Brook. As detailed in Section 8.9, Dam Brook would be realigned to create a more sinuous open channel with in-channel features, such as a regularly wetted berm, inset berms and point bars, whilst two new ecology ponds would be provided and two highway runoff attenuation ponds. The Dam Brook realignment works would reduce the length of existing brook channel by approximately 155m. In addition, the Scheme would require extensions of culverts associated with an unnamed watercourse emanating from Breadsall Manor, with culverting of existing open channel affecting approximately 124m of channel. These works would thus result in a collective loss of open channel of approximately 279m. However, most of the water flows from the unnamed watercourse would be diverted into a 260m long flood alleviation channel planted to form a wet woodland, discharging into the realigned Dam Brook. In addition, a new approximate 216m swale would also be created running adjacent to the Dam Brook before discharging to the realigned Dam Brook at the downstream A61 road culvert (refer to the Environmental Masterplan illustrated in Figure 2.12f [TR010022/APP/6.2]). Such works would thus result in the creation of approximately 476m of new open channel. Therefore, these collective works would thus result in a net gain in open channel of approximately 197m associated with Dam Brook and its tributaries (also refer to Little Eaton junction WFD Assessment Report provided in Appendix 13.3B [TR010022/APP/6.3]).

- 8.10.44 Taking the above into account, there would be a slight<sup>29</sup> adverse non-significant effect (at the Local scale) on the Dam Brook and unnamed tributary in the short term<sup>30</sup> during the Scheme construction phase until the habitats associated within the realigned channel, multi-stage flood alleviation channel and the new swale have established. However, given the mitigation proposed to provide a more sinuous Dam Brook channel, the gain in open channel length and the provision of a wet woodland flood alleviation channel, there would be a moderate beneficial significant effect (at the County or Unitary Authority scale) on this watercourse in the medium to long-term. The confidence in this prediction is probable. The timing of habitat loss would consider impacts upon other ecological species, particularly for otter and fish (as detailed further in this section).
- 8.10.45 The proposed access into the main construction compound north of Little Eaton junction would need to cross over the remains of the former Derby Canal (Little Eaton branch). As indicated in Section 8.9, to avoid direct effects upon the former canal, a temporary bridge would to be used to cross the area which would not require any disturbance or earthworks to the former canal. Foundations for such temporary bridge structures could be installed back from the edge of the line of the former canal to avoid impacting on the existing vegetation and the canal profile. The design of the foundations would be dependent on ground conditions and loading requirements but may comprise pad foundations or a simple piled foundation. The bridging systems would be removed upon completion of the works, with the affected footprint area being reinstated to their former conditions. Further details of temporary bridge structures are provided in Chapter 2: the Scheme, paras. 2.6.101 to 2.6.105. It is thus considered that the Scheme would have a non-significant (neutral) effect on the Old Derby Canal. The confidence in this prediction is certain/near-certain.
- 8.10.46 There would be no other direct impacts to any other watercourses as associated with the Scheme.

Arable (Including improved grassland)

- 8.10.47 An area of approximately 11.37ha of arable and pasture (improved grassland) land would be permanently lost to the Scheme, with approximately 9.38ha being impacted on a temporary basis during the construction phase and which would be subject to restoration to unrestricted agricultural land post construction. None of the field margins that would be affected are considered notable. Grassland field margins (with less intense management regime requirements compared to arable fields) have been incorporated into the landscape design strategy for the Scheme, particularly adjacent to retained arable habitat linking the Scheme to the wider landscape; however away from the road (to avoid potential attraction of barn owl). It is considered that the temporary and permanent losses of arable land (and field margins) would have a non-significant (neutral) effect in terms of biodiversity (impacts associated with the loss of arable land on agricultural farm holdings is considered in Chapter 10: Geology and Soils). Confidence in the prediction is certain/near-certain. The timing of habitat loss would consider impacts upon other ecological species, particularly breeding birds (as detailed further in this section).

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<sup>29</sup> It is acknowledged that the affect is less than the value of the running water feature, due to the mitigation proposed and the watercourse affected.

<sup>30</sup> 'Short term' for watercourses is considered to be in the region of 1 to 2 years; 'medium term' 2 to 5 years; and 'long term' >5 years.

### Hedgerows

- 8.10.48 Approximately 509m of species-poor hedgerow would be lost as part of the Scheme (refer to Table 8.15), primarily at Little Eaton junction and in association with the floodplain compensation area. This would have a slight adverse non-significant effect (at the Local scale) on hedgerow due to Scheme construction activities. However, the landscape design includes approximately 107m of species-rich hedgerow to mitigate for hedgerows that would be lost (refer to the landscape drawing in Figure 7.8c [TR010022/APP/6.2] for details).
- 8.10.49 The planting of species-rich hedgerows would be undertaken at the earliest opportunity during the construction phase to enable rapid establishment of these linear habitat features which promote wildlife dispersal alongside the Scheme.
- 8.10.50 Given the mitigation provisions as detailed in Section 8.9 and above, it is considered that there would be a non-significant (neutral) effect on hedgerows (as based upon biodiversity value only) due to Scheme construction. Confidence in this prediction is certain/near certain. The timing of habitat loss would consider impacts upon other ecological species, particularly nesting birds and foraging and commuting bats (as detailed further in this section).

#### *Indirect effects – disturbance to habitats through surface runoff and dust from construction*

- 8.10.51 As detailed in Section 8.9, standard water pollution prevention control measures would be put in place to avoid potential impacts upon watercourses located adjacent to and downstream of the Scheme. In addition, best practice measures to control dust would also be implemented to avoid potential impacts during construction on habitats located adjacent to the Scheme boundary and those within 200m.
- 8.10.52 Given the implementation of standard water pollution prevention control measures and best practice measures to control dust, it is considered that there would be a non-significant (neutral) effect on habitats within watercourses and other retained habitats near the Scheme as a result of disturbance from construction activities. The confidence in this prediction is certain/near-certain.

#### ***Invasive non-native plant species***

- 8.10.53 It is an offence to spread or allow spread of invasive non-native plant species (as listed under Schedule 9 of the Wildlife and Countryside Act 1981 as amended) into the wild. As detailed in Section 8.9, invasive plant species would be managed according to the Outline Biosecurity and Management Plan contained within the OEMP (refer to Appendix 2.1 [TR010022/APP/6.3]). Treatment and control would be undertaken by an approved specialist contractor. This would be implemented through the CEMP, thus ensuring there would be no adverse impacts associated with the spread of invasive plant species during Scheme construction.

8.10.54 There is potential for some invasive non-native plant species to be eradicated due to the Scheme; for example, within parts of the construction compound to the north of Little Eaton junction. It is proposed that management extends beyond the construction compound footprint within the Scheme boundary to minimise risk of invasive species spreading into the compound. Such actions have the potential to have a beneficial effect on the biodiversity value of the existing habitat within this area.

### **Toads**

#### *Direct effects - habitat loss*

8.10.55 The Scheme would avoid the loss of ponds near the Scheme. In addition, the culverts connecting Markeaton Lake with the Mill Pond and Middle Brook would be retained, thus ensuring habitat connectivity is maintained throughout the construction phase for the population of toads recorded at Markeaton junction.

8.10.56 Some suitable amphibian terrestrial habitat would be lost within 250m of ponds Pa6 (Mill Pond 2), Pa7 (Mill Pond 1) and Pa8 (Markeaton Lake), shown on Figure 8.13 [TR010022/APP/6.2]; primarily a small area of semi-natural broadleaved woodland to the east of the existing A38 and road side verges at Markeaton junction. However, areas of most suitable terrestrial amphibian habitat are within immediate proximity to Markeaton Lake and Mill Ponds – such areas would be retained and would not be adversely affected by the Scheme.

8.10.57 The loss of suitable terrestrial amphibian habitat (beyond the immediate proximity of ponds 6a, 7 and 8) would be temporary, given that landscape planting of the area would incorporate a mixed habitat mosaic including the provision of hibernacula and log piles (suitable refugia for amphibians) (refer to landscape drawing in Figure 7.8b [TR010022/APP/6.2] and the Environmental Masterplan illustrated in Figure 2.12c/d [TR010022/APP/6.2]).

8.10.58 Given the implementation of the mitigation measures as detailed above and in Section 8.9, it is considered that there would be a non-significant (neutral) effect on toads at Markeaton junction from habitat loss. The confidence in this prediction is certain/near-certain.

#### *Direct and indirect effects - risk of mortality, injury and disturbance*

8.10.59 Loss of terrestrial habitat suitable for toads due to the Scheme has the potential to result in the killing or injuring of toads. However, the risks are considered to be low, given the most suitable toad habitat is located in immediate proximity to Markeaton Lake and Mill Ponds which would not be directly affected by the Scheme. Nevertheless, as detailed in Section 8.9, destructive searches of suitable refugia for toads at Markeaton junction by hand would be undertaken during the Scheme construction phase, with captured individuals being translocated to suitable receptor sites (namely Markeaton Lake and Mill Ponds). Appropriate fencing would be used to restrict translocated toads from re-entering the working construction area.

8.10.60 Access ramps would also be provided within any areas of excavation overnight to ensure that any toads which enter these areas can escape.

- 8.10.61 Standard water pollution prevention controls measures, and best practice measures to control dust would be implemented to minimise any potential indirect impact on toads and their food sources.
- 8.10.62 Given the implementation of the mitigation measures as detailed above and in Section 8.9, it is considered that there would be a non-significant (neutral) effect on toads from construction activities. The confidence in this prediction is certain/near certain.

***Breeding birds***

*Direct effects - loss of foraging habitat for barn owl*

- 8.10.63 The Scheme would result in the loss of approximately 1.82ha of arable land during construction at Little Eaton junction; of which approximately 0.95ha would be reinstated and returned to agricultural land. Such losses of foraging habitat would have a non-significant (neutral) effect on barn owl, given the presence of extensive adjacent areas of arable land which is likely to be part of the existing foraging habitat range for barn owl. In addition, the landscape design at Little Eaton junction would provide additional foraging habitat for barn owl (refer to landscape drawing in Figure 7.8c [TR010022/APP/6.2]). Confidence in this prediction is certain/near-certain.

*Indirect effects - displacement from barn owl nest sites from construction activities*

- 8.10.64 A pre-construction survey of potential nesting features, combined with appropriate buffer zones being put in place during construction should barn owls be found to be present, would ensure a non-significant (neutral) effect on barn owl during Scheme construction. Confidence in the prediction is probable.

*Direct effects - loss of foraging habitat for notable farmland birds*

- 8.10.65 There would be loss of approximately 11.37ha of pastoral and arable habitat lost temporarily, and approximately 1.99ha of pastoral and arable habitat lost permanently due to the Scheme at Little Eaton junction. However, the notable farmland bird assemblage (including yellowhammer, yellow wagtail, linnet, reed bunting and skylark) were typically found >100m from the Scheme boundary at Little Eaton junction. Thus, losses of pastoral and arable habitat are not anticipated to adversely affect this bird assemblage, especially given that there are plenty of alternative foraging habitats available in the wider landscape. In addition, the landscape design at Little Eaton junction would provide additional foraging habitat for birds, including reinstating approximately 9.38ha of pastoral and arable habitat, and creating grassland margins (refer to landscape drawing in Figure 7.8c [TR010022/APP/6.2]). It is thus considered that there would be a non-significant (neutral) effect on the farmland bird assemblage at Little Eaton junction due to foraging habitat loss. Confidence in this prediction is probable.



*Indirect effects - noise and visual disturbance to the notable farmland bird assemblage*

- 8.10.66 The notable farmland bird assemblage is primarily located >100m from the Scheme boundary at Little Eaton junction. However, Scheme construction would result in the removal of the existing shelterbelt of trees that runs parallel to the east of the A38. Loss of this shelterbelt would have a potential slight adverse non-significant effect on birds using the fields due to visual disturbance from construction activities.
- 8.10.67 To mitigate such effects, temporary screen fencing would be provided during the construction phase to minimise visual disturbance to farmland birds. In addition, as indicated in Section 8.9, a dense shelterbelt of trees is included within the landscape design to the east of the River Derwent and south and east of the new A38 mainline to replace habitats that would be lost. This shelterbelt of trees could be planted part way through the construction phase. Such advanced planting would assist in minimising potential disruption to birds nesting in the farmland, such as yellow wagtail and skylark. Similarly, early installation of the noise and screening barriers on new the southbound A38 mainline and the southbound diverge slip road at Little Eaton junction would further assist in minimising visual disturbance to farmland birds. With the implementation of these measures, it is considered that there would be a non-significant (neutral) effect on the farmland bird assemblage from disturbance by construction activities. Confidence in this prediction is probable.

*Direct effects - loss of habitat for nesting lapwing, little ringed plover and oyster catcher*

- 8.10.68 Scheme construction would result in the temporary loss (approximately 0.86ha) and permanent loss (approximately 1.23ha) of habitat that forms part of the Alfreton Grassland LWS located to the south-west of Little Eaton junction. The flooded pastoral land supports waders and waterfowl, including lapwing (confirmed as breeding in this location) and little ringed plover and oystercatcher (both possible breeders in the area). The grassland that would be permanently lost is typically dry and has some scattered scrub, which makes the area less suitable for species, such as lapwing, possible nesting little ringed plover and oystercatcher. The typically flooded southern part of this field is the optimal habitat which supports these and other wetland birds. This southern habitat area would not be directly affected by the Scheme.
- 8.10.69 The Scheme is not anticipated to significantly change the amount of water accumulating within this site, as the main source of water is considered to be overspills from Dam Brook and Watermeadows Ditch. In addition, as indicated in Section 8.9, standard water pollution prevention control measures would be in place, together with best practice measures to control dust.
- 8.10.70 Given the implementation of these mitigation measures, it is considered that there would be a non-significant (neutral) effect on lapwing, little ringed plover and oyster catcher from habitat loss to Scheme construction. Confidence in this prediction is probable.

*Indirect effects - noise and visual disturbance to nesting lapwing, potential nesting little ringed plover and oyster catcher*

- 8.10.71 The Scheme would result in the removal of the existing shelterbelt of trees running to the south of the A38 alignment. This tree loss would potentially have a moderate adverse significant effect (at the County or Unitary Authority scale) on lapwing, due to increased visual disturbance from construction activities (without mitigation). However, the provision of temporary screening and advance planting of sections of shelterbelt trees, would minimise visual disturbance to nesting lapwing and potentially nesting little ringed plover and oyster catcher.
- 8.10.72 The little ringed plover species is a Schedule 1 species and is thus protected from disturbance when nesting. As detailed in Section 8.9, if proposed construction works in the northern part of Alfreton Rough Grassland LWS are to be undertaken during the nesting season, bird deterrents (such as shiny tape attached to canes fixed into the ground) would be installed prior to the onset of (and during) the nesting season to deter little ringed plover from nesting onsite. An ornithologist would carry out pre-construction checks to ensure that the deterrents are working and that little ringed plovers are not nesting in the field within the Scheme boundary.
- 8.10.73 With the provision of the mitigation measures as detailed in Section 8.9, it is considered that there would be a non-significant (neutral) effect on the nesting lapwing, potential nesting little ringed plover and oyster catcher from disturbance during Scheme construction. Confidence in the prediction is probable.

*Direct effects – habitat loss for common nesting bird species; and risk of mortality and injury to nesting birds (legally protected) from construction activities*

- 8.10.74 Whilst the Scheme design aims to retain existing trees and vegetation within the Scheme boundary as much as possible, there would be areas of vegetation clearance at all junctions.
- 8.10.75 To mitigate for the loss of habitat of value to foraging and nesting birds across the Scheme footprint, trees and shrubs of local provenance would be planted as part of the landscape design (as detailed in Section 8.9 and the landscape design drawings - Figures 7.8a - 7.8c [TR010022/APP/6.2]). Such planting would provide nesting and food resources for birds, particularly for those Amber and Red List species such as song thrush and dunnock. Planting would include berry-bearing species such as hawthorn, blackthorn and elder.
- 8.10.76 In addition to landscape planting, to further mitigate for the loss of nesting habitat for some species (predominantly cavity nesters), bird nest boxes would be installed within areas of retained habitat (approximately 20 bird boxes within Mackworth Park) (refer to the Environmental Masterplan as presented in Figure 2.12a [TR010022/APP/6.2]). Such bird boxes would provide alternative nesting resources for a variety of different bird species (e.g. open-fronted and small-hole boxes).

- 8.10.77 As detailed in Section 8.9, standard best practice measures would be that the Scheme vegetation clearance works would avoid the nesting bird period (March to August) inclusive. However, if the nesting bird season cannot be avoided, then nesting bird checks would be undertaken by an ornithologist prior to vegetation removal. If nesting birds are located, appropriate buffers would be put into place until the nest was no longer in use.
- 8.10.78 With the implementation of the mitigation measures as detailed in Section 8.9, it is considered that there would be a non-significant (neutral) effect on common nesting birds from habitat loss, or direct mortality or injury to birds from construction activities. Confidence in this prediction is certain/near certain. The timing and method of vegetation clearance would, however, need to consider other protected species such as bats, toads and hedgehogs (where applicable).

### **Wintering birds**

*Direct effects - loss of habitat for notable wintering bird assemblage (including lapwing, teal and black-headed gull)*

- 8.10.79 Impacts upon waders and waterfowl (including lapwing, teal and black-headed gull) using the flooded pastoral land located south-west of Little Eaton junction would be the same as those detailed for nesting lapwing, little ringed plover and oyster catcher. With the implementation of the same mitigation measures, plus the habitats that would sequentially be provided by the Dam Brook diversion works (e.g. ecology ponds, highway runoff attenuation ponds, it is considered that there would be a non-significant (neutral) effects on wintering birds from habitat loss from construction of the Scheme. Confidence in this prediction is probable.

*Indirect effects - loss noise and visual disturbance to notable wintering bird assemblage (including lapwing, teal and black-headed gull)*

- 8.10.80 Removal of the existing shelterbelt running to the south of the new A38 alignment would potentially have a slight adverse non-significant effect (at the Local scale) on wintering birds in the flooded fields to the south-west of Little Eaton junction due to increased visual disturbance during Scheme construction activities.
- 8.10.81 The provision of temporary screening, and advance planting of sections of shelterbelt trees, would minimise visual disturbance to wintering birds.
- 8.10.82 With the provision of the mitigation measures as detailed in Section 8.9, it is considered that there would be a non-significant (neutral) effect on wintering birds from disturbance from construction of the Scheme. Confidence in this prediction is probable.

### **Bats – roosting**

*Direct effects - loss of confirmed roosts in tree(s), buildings(s) and bridge(s); and risk of mortality or injury to bats*

- 8.10.83 Scheme construction would result in the loss of the following bat roosts (refer to Figure 8.21 and 8.22 [TR010022/APP/6.2]):
- [REDACTED] with a confirmed noctule maternity roost and potential hibernation roost (estimate of 10 individuals). Removal of the tree would result in a moderate adverse significant effect on bats using this roost.

- **B8-QW30:** Queensway (QW) building No. 30 at Markeaton junction with confirmed whiskered and common pipistrelle occasional roost (less than five individuals). Demolition of the building would result in a slight non-significant adverse effect on bats using this roost.
- **B2 Flood Arch Bridge:** Structure to the west of Little Eaton junction with confirmed occasional day and feeding roost by common and soprano pipistrelle bats (less than 10 individuals) and occasional night roost by brown long-eared bats (less than five individuals). The bridge is proposed to be extended to the south which would result in a slight non-significant adverse effect on bats using this roost.

8.10.84 All works to confirmed bat roosts would be undertaken under a NE EPSML and have been provisionally agreed with NE (see Appendix 8.19: Letter of No Impediment [TR010022/APP/6.3]). Specific bat mitigation measures that would be undertaken are detailed in Section 8.9 and have been defined considering guidance within IAN 116/08 (Highways Agency, 2008). Mitigation measures related to the loss of bat roosts are as follows:

- **█ and B8-QW30 building at Markeaton junction:**
  - Translocation of known roosting features from tree M2, noctule maternity roost (and potential hibernation roost), with sections of the tree M2 being strapped and attached to a nearby tree (G361\*) under direction of a bat licence holder.
  - An eco-rocket box would be implemented within the same woodland parcel (G361\*) as the noctule roost.
  - Integration of bat roost features onto the approximately 4m high noise barrier along the Scheme boundary with the Royal School for the Deaf at Markeaton junction. Sections of the noise barrier (facing away from the road) would be provided with a 2cm wooden cavity which would be sectioned regularly to provide different lengths of cavities available to suit more than one bat species. Replacement roosting features would comprise approximately 6 no. along the length of the noise barrier.
  - A bat box suitable for hibernation positioned within the woodland parcel (G361\*) in the unlikely scenario that bats are encountered during licenced soft strip and demolition of building QW30. This would be a temporary feature if it was not utilised by bats during the construction period.
  - Work supervision by a licenced bat worker, with the timing of works aiming to minimise impacts on summer and potential winter roosts (where applicable).
- **B2 flood arch bridge at Little Eaton junction:**
  - Three bat boxes would be installed as part of the bridge extension works within the bridge abutment to create replacement roosting locations.
  - Works supervision by a licenced bat worker, with the timing of the works aiming to minimise impacts on summer roost.

8.10.85 As detailed in Section 8.5, No 4, 12, 14 and 16 on Queensway and No 259 Ashbourne Road, which are all proposed for demolition, were not subject to a full suite of bat surveys in 2017/2018 due to access restrictions. Should any bats be recorded using these buildings during pre-construction surveys, the draft EPSML for buildings within the Scheme (where a bat roost is confirmed at No 30 Queensway) would be amended to include any additional roosts. Multiple surveys have been undertaken near these buildings during 2017, including at neighbouring properties, and bat activity associated with any significant roosts would have been recorded had they been present. Thus, it is considered that there is a low possibility that these buildings could support low conservation status roosts (small roosts of common species) and that roosts of higher conservation value (maternity roosts or roosts of rarer species) are unlikely to be present.

8.10.86 Taking into account the mitigation measures as detailed in Section 8.9 and above, it is considered that there would be a non-significant (neutral) effect on bats as a result of loss of confirmed roosts and risk of mortality and injury from construction activities. Confidence in this prediction is probable. Integration of bat roost features into the noise barrier has the potential to result in an overall beneficial effect on bats. However, this is a novel technique which is yet to be formally monitored or tested. Therefore, this potential beneficial effect has not been included in the definition of residual effects.

*Direct effects - loss of potential roost features in trees, buildings and structures across the Scheme*

8.10.87 At Kingsway junction and Markeaton junction, the following potential bat roost features would be lost due to Scheme construction:

- Two bridge structures on Brackensdale Avenue (low suitability) are to be widened to cater for the provision of the additional lane on each carriageway at Kingsway junction.
- Eighteen trees (one with high suitability; nine with moderate suitability; and 8 with low suitability) would be removed during Scheme construction. Most of these trees are located in the vicinity of the Markeaton footbridge and within the utilities corridor within Markeaton Park.
- Sixteen properties at Queensway (one with high suitability; seven with moderate suitability; and eight with low suitability) would be demolished at Markeaton junction.
- One toilet block within Markeaton Park (low suitability) would be demolished at Markeaton junction.
- One bridge structure at Kingsway junction is to be demolished (low suitability).

8.10.88 No potential roost features would be lost due to Scheme construction at Little Eaton junction, with all potential bat roost features being retained.

8.10.89 Table 8.16 summarises the potential bat roost features that would be lost during Scheme construction - refer to Figure 8.21 and Figure 8.22 [TR010022/APP/6.2].

**Table 8.16: Summary of the potential bat roost features to be lost**

Tree/ building/ structure	Reference	Bat suitability	Location
<b>Kingsway junction and Markeaton junction</b>			
Bridges	B4, B5	Low	Located on Brackensdale Avenue at Kingsway junction
	B6	Low	Located at Kingsway junction
Trees	M36 (also confirmed Veteran Tree T358*)	High	Located to the east of the A38 close to Markeaton footbridge
	<b>M1, M3, M4, M6**</b>	Moderate	
	M44, M49, M50	Low	
	<b>M23, M29, M51, M53</b>	Moderate	Located to the west of the A38 within Markeaton Park
	<b>M21, M22, M52, M54</b>	Low	
	T7	Low	Located between Kingsway and Markeaton junction
	<b>T2</b>	Moderate	Located within Mackworth Park at Kingsway junction
Buildings	B8-QW32	High	Properties located on Queensway at Markeaton junction
	B8-QW2, B8-QW4, B8-QW8, B8-QW14, B8-QW16, B8-QW20, B8-QW26	Moderate	
	B8-QW6, B8-QW10, B8-QW12, B8-QW18, B8-QW22, B8-QW24, B8-QW257, B8-QW259	Low	
	B10	Low	Toilet block located within Markeaton Park
<b>Little Eaton junction</b>			
None			

\*Arboricultural Impact Assessment Report - Tree Reference (refer to Appendix 7.2 [TR010022/APP/6.3])

\*\*Those references in **bold** within the table also have potential hibernating features for bats

8.10.90 Although bats were not confirmed roosting in these features during surveys, the loss of these potential roost features could have a slight non-significant adverse effect on roosting bats. Specific bat mitigation measures as follows are proposed:

- Installation of 10 bat mitigation features within Mackworth Park, namely: bat boxes such as 4 x Schwegler 2F, 2 x Schwegler 1FF and 2 x Schwegler 1FS, and hibernation boxes 2 x Schwegler 1FW.
- Creating suitable roost features in approximately 10 retained trees within the Scheme boundary at Markeaton Park (proactive management to improve their habitat value by creating features including natural fracture pruning).
- Creation of three totem poles within Markeaton Park using trees with existing roost features that would be felled due to the Scheme.
- Careful soft felling of trees, with supervision of the works and pre-construction checks by a bat licenced worker (where applicable).

8.10.91 Taking into account the mitigation measures detailed in Section 8.9 and above, it is considered that there would be a non-significant (neutral) effect on bats as a result of loss of potential roosts. Confidence in this prediction is certain/near-certain. The use of higher quality potential roost features could result in an overall beneficial effect for bats. However, this potential beneficial effect has not been included in the definition of residual effects.

*Indirect effects - disturbance to retained maternity roost at the River Derwent bridge*

8.10.92 There is a common pipistrelle maternity roost confirmed, and potential for small day roosts of Daubenton's and soprano pipistrelles, at the River Derwent bridge to the west of Little Eaton junction. There would be no direct Scheme impacts to the bridge. A 50m buffer of vegetation would be retained around the roost, whilst additional mitigation measures would include maintaining current conditions (dark areas) around the bridge to prevent any potential displacement from the Scheme works.

8.10.93 It is thus considered that there would be no significant (neutral) indirect effect on the maternity roost at the River Derwent from Scheme construction activities. Confidence in this prediction is certain/near-certain.

*Indirect effects - disturbance to other retained confirmed (and potential) roosts in trees and buildings*

8.10.94 The following bat roosts have been confirmed within 50m of the Scheme boundary which whilst not directly impacted by Scheme construction activities, they could be affected indirectly due to disturbance (refer to Figure 8.21 and 8.22 [TR010022/APP/6.2]):

- **Building B13:** building within 50m of the Scheme boundary at Markeaton junction. Pipistrelle species (roost status unknown) droppings found during a daytime assessment and anecdotal evidence of a roost present.

- **Building B9 Ford Park Static Homes:** Caravan N within 50m of the Scheme boundary at Little Eaton junction (presumed a small day Pipistrelle species roost as there is a desk study record of a single common pipistrelle for Caravan F, whilst one bat dropping was found at Caravan N during an external daytime inspection).

8.10.95 Tree M39 was previously confirmed as a bat roost in 2015, however, no bat roost was recorded during the 2018 bat surveys.

8.10.96 Appropriate buffer zones of at least 50m would be maintained around these confirmed (and previously confirmed) roost features, in line also with tree root protection zones (where applicable). Lighting and vehicle movements would also be appropriately controlled (where applicable), as implemented through the CEMP. These mitigation measures would also be applied to potential bat roost features to be retained across the Scheme (where applicable). With the implementation of the mitigation measures as detailed in Section 8.9 and above, it is considered that there would be a non-significant (neutral) indirect effect on roosting bats from disturbance from Scheme construction activities. Confidence in this prediction is certain/near certain.

#### ***Bats – foraging and commuting***

*Indirect effects - loss of habitat of value to foraging and commuting bats (all species)*

8.10.97 Populations of 'rarer' bat species (whiskered, Brandt's, daubenton's, natterer's, noctule and serotine) were recorded at Markeaton Park, Daubenton's and whiskered/Brandt's bats were recorded foraging along the River Derwent (including near the A38 river crossing), whilst occasional Leisler's or serotine bats were recorded in the vicinity of Little Eaton junction. Populations of 'common' bat species (common pipistrelle, soprano pipistrelle and brown long-eared) were recorded across the Scheme.

8.10.98 The key bat activity hot spots recorded were at:

- To the west of Mackworth Park (and along the Mickleover Railway Cutting LWS) at Kingsway junction.
- Markeaton Park and Mill Ponds, located either side of the Markeaton footbridge at Markeaton junction.
- River Derwent (north and south of the A38 bridge; in association also with the A38 Scrub Other Site of Interest) at Little Eaton junction.
- To the north of the B2 Flood Arch Bridge at Little Eaton junction.

8.10.99 At Kingsway junction, the Scheme would have no impact upon the Mickleover Railway Cutting LWS, and there would not be any significant habitat loss within Mackworth Park (although sections of the shelterbelt between the A38 and Mackworth Park would need to be removed in order to facilitate construction of an underground highway drainage tank on the edge of Mackworth Park, as well as some tree clearance at the Kingsway hospital site in order to gain access to flood storage areas next to Bramble Brook).



- 8.10.100 At Markeaton junction, the Scheme design has aimed to minimise tree loss within Markeaton Park LWS i to ensure the functional integrity of the LWS remains. There would be temporary loss of the Markeaton footbridge which potentially acts as a navigational cue for bats in the area; however, the replacement footbridge would be installed during the construction phase (as indicated in Chapter 2: the Scheme, para. 2.6.93, it is assumed that the existing Markeaton footbridge would be removed, with a replacement footbridge being installed approximately 1 and a half years after existing bridge demolition).
- 8.10.101 At Little Eaton junction, there would be no loss of habitat in the immediate vicinity of the River Derwent. The Scheme design has also minimised the use of the A38 Scrub Other Site of Interest, with approximately 0.17ha (13%) being temporarily lost during the construction phase, with the area being reinstated post-construction. The areas of habitat to the north of the A38, where bat activity hot spots were identified, would also be retained.
- 8.10.102 It is anticipated that there would be a slight non-significant adverse effect<sup>31</sup> (at the Local scale) in the short to medium term on foraging and commuting bats from habitat loss across the Scheme footprint due to Scheme construction activities until replacement habitat establishes. However, to mitigate for this, provision has been made for the creation and enhancement of existing habitats of value to foraging and commuting bats, including recommended plant species within the Bat Conservation Trust (BCT) Encouraging Bats Guide (BCT, 2015). Additionally, the provision of advance planting and the phasing of vegetation clearance would further reduce construction impacts on foraging and commuting bats, particularly at Little Eaton junction. Hedgerows (linear habitat features) have also been incorporated into the landscape design to mitigate for those lost and ensure ecological connectivity within and across the Scheme, and into the wider landscape (refer to the landscape design drawings - Figures 7.8a - 7.8c [TR010022/APP/6.2]). With these mitigation measures in place, it is considered that there would be no significant (neutral) effect on foraging and commuting bats (all species) in the short to medium term. In addition, given the installation of the water features and wetland habitat proposed in association with the Dam Brook realignment works, there is potential for a slight non-significant beneficial effect (at the Local scale) on foraging and commuting bats in the long term. Confidence in this prediction is probable.
- 8.10.103 As detailed in para. 8.5.10, there is potential for the installation of a green footbridge at Markeaton junction rather than the like for like footbridge replacement that would be provided by the Scheme – this green footbridge may be delivered as part of a Designated Funds project (and therefore does not comprise part of the Scheme) and would benefit bats at a local and landscape scale. However, this potential beneficial enhancement effect has not been considered as part of the assessment of residual effects.

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<sup>31</sup> It is acknowledged that the effect (slight - local) is less than the geographical importance the ecological feature is valued at (moderate – county); given that the main bat activity hot spots are primarily to be unaffected by the Scheme/retained.

*Indirect effects - disturbance to foraging and commuting bats (all species)*

- 8.10.104 As detailed in Section 8.9, best practice construction measures would be in place to minimise disturbance to foraging and commuting bats through minimising night-time working and avoiding direct illumination of retained vegetation which acts as foraging and commuting corridors from confirmed (and potential) bat roost sites.
- 8.10.105 With the implementation of such mitigation measures, it is considered that there would be a non-significant (neutral) indirect effect on foraging and commuting bats from construction activities. Confidence in this prediction is probable.

**Badger**

*Direct effects - loss of badger setts*

- 8.10.106 No main badger setts would be lost across the Scheme. However, six subsidiary and outlier setts would be lost across the Scheme.
- 8.10.107 Pre-construction monitoring surveys would be undertaken to determine any change in badger activity and to identify any new setts within or adjacent to the Scheme footprint which may be directly impacted by construction works.
- 8.10.108 As detailed in Section 8.9, closure of badger setts would be undertaken in accordance with a NE badger sett closure licence at an appropriate time of year (between 1 July and 30 November) and implementing appropriate methods of exclusion as provisionally agreed with NE (see Appendix 8.19: Letter of No Impediment [TR010022/APP/6.3]).
- 8.10.109 With mitigation, and given that the Scheme would not impact upon any main setts, it is considered that the Scheme would have a non-significant (neutral) effect on badgers from construction activities. Confidence in this prediction is certain/near certain.

*Direct effects - disturbance and damage to badger setts (including risk of mortality and injuring badgers whilst occupying a sett)*

- 8.10.110 To avoid Scheme construction activities causing harm to badgers (or disturbance of badgers) occupying setts that would be retained, suitable working practices, as detailed within the CEMP (refer to the OEMP in Appendix 2.1 [TR010022/APP/6.3]), would be implemented within proximity to retained setts. At least a 30m buffer zone would be retained around main setts during the Scheme construction phase. Retained setts would be monitored during the construction phase.
- 8.10.111 With the implementation of the mitigation measures as detailed in Section 8.9 and above, it is considered that there would be a non-significant (neutral) effect on badgers from disturbance and damage to badger setts, including the risk of mortality and injury by construction activities. Confidence in this prediction is certain/near-certain.

*Direct effects - loss of badger foraging habitat across the Scheme (including habitat fragmentation)*

- 8.10.112 There would be permanent loss of badger foraging habitat at Kingsway junction. However there is suitable foraging and commuting habitat in the wider area for badgers at Kingsway junction.

8.10.113 At Little Eaton junction, badger commuting routes identified would be retained during Scheme construction.

8.10.114 There would be temporary loss of foraging habitat at Little Eaton junction which would be reinstated post-construction. There would also be some permanent loss in association with the loss of arable land. However, there is extensive alternative habitat immediately to the south and east within known badger territory range.

8.10.115 With the implementation of the mitigation measures detailed in Section 8.9 and above, it is considered that there would be a non-significant (neutral) effect on foraging and commuting badgers from habitat loss from Scheme construction activities. Confidence in this prediction is probable.

*Indirect effects - disturbance to foraging and commuting badger*

8.10.116 As detailed in Section 8.9, water pollution prevention control measures and standard best practice measures to control construction dust and noise would be implemented during the construction phase via the CEMP (refer to the OEMP in Appendix 2.1 [TR010022/APP/6.3]). Adherence to such measures would minimise disturbance to foraging and commuting badgers. In addition, measures to further minimise effects upon badger include the temporary installation of ramps within any open trenches to provide a means of escape should any badgers enter such excavations, through minimising night-time working and avoiding direct illumination of retained vegetation which acts as foraging and commuting corridors.

8.10.117 Considering these mitigation measures, it is considered that there would be a non-significant (neutral) effect on foraging and commuting badgers as a result of disturbance from construction activities. Confidence in this prediction is certain/near certain.

**Hedgehogs**

*Direct effects - habitat loss*

8.10.118 The permanent loss of the private gardens on Queensway, together with temporary and permanent loss of parkland within Markeaton Park, would result in a slight non-significant adverse effect (at the Local scale) on hedgehogs.

8.10.119 To mitigate for this loss of habitat, the landscape design at Markeaton junction includes mixed urban planting with shrubs, scrub, trees and grassland – this includes the planting within the area of replacement public open space at Queensway (refer to the landscape design drawing - Figure 7.8b [TR010022/APP/6.2]). With such mitigation, it is considered that there would be a non-significant (neutral) effect on hedgehogs from habitat loss due to construction of the Scheme. Confidence in the prediction is certain/near-certain.

*Direct effects - risk of mortality and injury from construction activities*

8.10.120 Removal of suitable hedgehog habitat at Markeaton junction during the Scheme construction phase would result in the risk of mortality and injury of hedgehogs – this could result in a slight non-significant adverse effect (at the Local scale) on hedgehogs.

- 8.10.121 It is unlikely that vegetation (shrubs and scrub) removal around Markeaton junction (particularly within Markeaton Park and in the gardens of the Queensway properties to be demolished) could be undertaken outside of the hibernation period due to the need for vegetation clearance outside the nesting bird season. Clearance works would, therefore, be preceded by a hand search for hedgehogs by a suitably qualified ecologist or the ECoW.
- 8.10.122 With the implementation of these mitigation measures, it is considered that there would be a non-significant (neutral) effect on hedgehogs from construction activities. Confidence in this prediction is certain/near-certain.

### **Otter**

#### *Direct effects - habitat loss from construction of culverts and realignment of Bramble Brook and Dam Brook*

- 8.10.123 The existing Bramble Brook channel provides poor commuting and foraging opportunities for otter and no holts or resting sites were recorded during surveys. Bramble Brook channel is also significantly fragmented from the Markeaton Brook catchment by extensive lengths of culvert. The Scheme works at Kingsway junction would require the realignment of the brook, as well as culverting, such that there would be a loss of approximately 131m of open channel within the junction, and an approximate 30m extension of the existing culvert under the southbound A38 carriageway to the west of the junction. Such works have the potential to have a slight non-significant adverse effect (at the Local level) on otter due to the loss and fragmentation of available open channel habitat within an already heavily modified channel. To mitigate for the loss of open channel, as detailed in Section 8.9, the realigned channel would be provided with series of inset alternate berms, whilst wetland habitat would be created within four flood storage areas (also refer to Kingsway junction WFD Assessment Report provided in Appendix 13.3A [TR010022/APP/6.3]), thereby improving otter foraging and commuting routes. Given such works, and the highly fragmented nature of the existing channel, overall there would be a non-significant (neutral) effect on otter at this location. The confidence in this prediction is probable.
- 8.10.124 The Dam Brook realignment works at Little Eaton junction, would result in initial otter habitat loss, which would destroy and sever foraging and commuting routes during the construction phase. This would temporarily fragment otter habitat, potentially resulting in a temporary moderate significant adverse effect (at the County or Unitary Authority scale) without mitigation. To mitigate this potential effect, the existing channel would be retained until the new realigned channel has been constructed. Further the realigned Dam Brook channel would be designed to be more sinuous, with new bed and bankside habitats improving otter foraging habitats. During the construction works themselves, working areas would be fenced off, whilst access ramps would be provided within any areas of excavation overnight to ensure that any otters which enter these areas can escape. With the provision of such measures, it is considered that there would be a non-significant (neutral) effect on otter; and potentially a moderate significant beneficial effect (at the County or Unitary Authority scale) on otter in the long term due to habitat gain. The confidence in this prediction is probable.

*Indirect effects - disturbance to otters from construction activities*

- 8.10.125 The construction phase of the Scheme could disturb commuting and foraging otters, however, considering the territorial range of otters and the lack of any confirmed recorded holts or resting sites within the vicinity of Kingsway junction, Markeaton junction and Little Eaton junction during the most recent surveys, this impact would have a temporary slight non-significant adverse effect (at the Local scale) on otter.
- 8.10.126 Pre-commencement surveys would be undertaken to determine the presence and absence of otter within the Scheme footprint prior to the start of the construction works and confirm the necessary mitigation requirements. As detailed in the section above, construction working areas would be fenced off, with access ramps provided within areas of excavation overnight to enable any otters to escape. In addition, water pollution prevention control measures and standard best practice measures to control construction dust and noise would be implemented during the construction phase via the CEMP (refer to the OEMP in Appendix 2.1 [TR010022/APP/6.3]), thereby minimising potential impacts on otters and their food sources.
- 8.10.127 With the implementation of the mitigation measures as detailed in Section 8.9 and above, it is considered that there would be a non-significant (neutral) effect on otters from disturbance during Scheme construction activities. The confidence in this prediction is probable.

***Terrestrial invertebrates***

*Direct effects - habitat loss*

- 8.10.128 As detailed in para. 8.10.31, approximately 0.28ha of species-rich grassland at Kingsway junction with notable terrestrial invertebrate assemblage would be permanently lost due to Scheme construction. Mitigation would involve the creation of new species-rich grassland (approximately 0.28ha) within Markeaton Park through suitable translocation, planting and seeding with a bespoke native seed mix to replace the habitats lost.
- 8.10.129 In addition, as detailed in paras. 8.10.32 and 8.10.33, species-rich grassland lost at the construction compound to the north of Little Eaton junction would be subject to re-instatement to pre-existing conditions post construction; and additional species-rich grassland would be planted across the Scheme.
- 8.10.130 Additional species-rich grassland planting, to mitigate for the loss of species-poor grassland lost due to the Scheme, has been incorporated into the landscape design. This includes areas of species-rich grassland at all three junctions - refer to the landscape drawing Figures 7.8a - 7.8c [TR010022/APP/6.2] for details. The species planted would be beneficial for notable terrestrial invertebrate species, noting that the landscape design incorporates disease resistant elms near Markeaton Park and Mackworth Park which would be beneficial and potentially contribute to the survival of white-letter hair-streak butterfly recorded from the wider area (although this species was not recorded during surveys).

8.10.131 With the mitigation measures proposed as detailed in Section 8.9 and above, it is considered that there would be a non-significant (neutral) effect on terrestrial invertebrates from habitat loss during Scheme construction. However, opportunities for biodiversity gains have been taken, including planting of road side verges, creation of habitats with varied topography, species-rich grassland planting and creation of log piles, whilst some felled trees would be retained on site as whole boughs and trunks which would benefit invertebrates. With these additional measures, it is considered that there would be a slight non-significant positive effect on terrestrial invertebrates in the long term. Confidence in this prediction is probable.

*Direct effects - risk of mortality to terrestrial invertebrates*

8.10.132 Scheme construction works are unlikely to have a significant impact on the mortality of terrestrial invertebrates, given that the population dynamics of invertebrate communities are unlikely to be permanently affected. There is notable habitat for invertebrates adjacent to the Scheme which would remain unaffected by construction activities and thus available for invertebrates being displaced by vegetation clearance activities at Kingsway junction and Little Eaton junction. As detailed in Section 8.9, pollution prevention control measures and standard best practice measures to control construction dust would be in place to protect such areas.

8.10.133 With the implementation of the defined mitigation measures, it is considered that there would be a non-significant (neutral) effect on the maintenance of terrestrial invertebrate communities from Scheme construction activities. Confidence in this prediction is certain/near-certain.

***Aquatic macroinvertebrates***

*Direct effects - habitat loss from construction of culverts and the realignment of Bramble Brook and Dam Brook*

8.10.134 Scheme construction works at Bramble Brook would result in open channel losses (approximately 161m), thus resulting in the loss of existing habitat for aquatic macroinvertebrates. Bramble Brook was assessed as having moderate to good biological water quality, and of low to moderate conservation value. The macroinvertebrate community present is one that is relatively tolerant to changes in water quality. Nevertheless, habitat loss of this modified channel would result in a slight non-significant adverse effect (at the Local scale) on aquatic invertebrates within Bramble Brook in the absence of mitigation. To mitigate for the loss of open channel and resultant impacts upon aquatic macroinvertebrates, the Scheme design includes the following measures (refer to para. 8.9.9 bullet point on habitat creation and biodiversity opportunities associated with watercourses features): a series of inset alternate berms within the realigned channel and the creation of wetland habitat within four flood storage areas. Further details are provided in the Kingsway junction WFD Assessment Report (refer to Appendix 13.3A [TR010022/APP/6.3]), which concludes that with the implementation of these measures, there would be no deterioration in the WFD status of the waterbody due to the Scheme. Therefore, it is considered that there would be a non-significant (neutral) effect on aquatic invertebrates from habitat loss. Confidence in this prediction is probable.

8.10.135 The Scheme works at Little Eaton junction would require Dam Brook to be realigned. Whilst these works would reduce the open channel length of Dam Brook by approximately 155m, there would be an overall increase of approximately 476m of new open channel due to the creation of a new flood alleviation channel planted to form a wet woodland, plus a new approximately 216m long swale. In addition, the works at Little Eaton junction involve the creation of two highway runoff attenuation ponds, plus two wildlife ponds. All these features would provide additional habitat for aquatic macroinvertebrates in the long term. Dam Brook was assessed as being of very good biological water quality and of moderate conservation value, supporting a macroinvertebrate community sensitive to changes in water quality. Further details are provided in the Little Eaton junction WFD Assessment Report (refer to Appendix 13.3B [TR010022/APP/6.3]) which concludes that with the defined package of mitigation, the Scheme at Little Eaton junction would support WFD objectives. Due to the proposed realignment of Dam Brook, and the provision of additional habitat in the long term, it is considered that there would be a non-significant (neutral) effect in the short to medium term; and a potential moderate beneficial significant effect (at the County or Unitary Authority scale) on the aquatic macroinvertebrate community in the long term due to habitat gain. Confidence in this prediction is probable.

*Direct effects - risk of mortality to aquatic invertebrates from construction activities*

8.10.136 All the watercourses within and near the Scheme boundary (namely Bramble Brook at Kingsway junction; Middle Brook and Markeaton Brook at Markeaton junction; and Dam Brook, Watermeadows Ditch and the River Derwent at Little Eaton junction), could be affected by Scheme construction activities. Such effects are assessed in Chapter 13: Road Drainage and the Water Environment, and include runoff from construction areas, resulting in the potential discharge of silt and other pollutants into watercourses. Such discharges have the potential to have an adverse effect on communities of aquatic macroinvertebrates within these watercourses. This is particularly relevant to the Markeaton Brook and Middle Brook at Markeaton junction, and Dam Brook and the River Derwent at Little Eaton junction, where the macroinvertebrate communities have been assessed as either sensitive or very sensitive to changes in water quality.

8.10.137 As detailed in Section 8.9, water pollution prevention control measures would be implemented during the construction phase via the CEMP (refer to the OEMP in Appendix 2.1 [TR010022/APP/6.3]), thereby minimising potential impacts on macroinvertebrates. With the implementation of these measures, it is considered that there would be a non-significant (neutral) effect on macroinvertebrate communities in these watercourses. Confidence in this prediction is certain/near-certain.

## **Fish**

### *Direct effects - risk of mortality to protected/notable fish due to the realignment of Dam Brook*

- 8.10.138 The Dam Brook realignment works due to the Scheme at the Little Eaton junction has the potential to adversely impact upon fish, including notable species, namely brook lamprey, bullhead and brown trout. Without mitigation, these works would result in a moderate adverse significant effect (at the County or Unitary Authority scale) on fish populations in the watercourse.
- 8.10.139 As detailed in Section 8.9, a mitigation strategy has been developed, whereby the new channel for the Dam Brook realignment would be created offline, with water then being diverted into the new channel from the existing channel. Prior to the diversion works, the existing channel would be electro-fished to ensure that all fish are removed before the channel is drained and connected to the new channel. The old channel would then be hand-searched and selective areas of silt sieved to locate any remaining ammocoetes (young brook lamprey) and ensure they are not left stranded. Any brook lamprey, three-spined stickleback and stone loach found in the old channel would be moved to a suitable receptor site downstream on Watermeadows Ditch (within the Scheme boundary). Brown trout, bullhead and perch collected would be translocated to the River Derwent (within the Scheme boundary) (as the Watermeadows Ditch was considered unsuitable for these species due to poor habitat suitability and water quality).
- 8.10.140 In addition, the proposed wildlife ponds located near the new Dam Brook channel have been designed to provide suitable habitat for fish. The ponds would have a downstream connection to Dam Brook to enable success of created habitat in the long term; providing fish refugia and a route for fish to enter and exit in a flood event or if the ponds are drying out.
- 8.10.141 With the implementation of these mitigation measures, it is considered that there would be a non-significant (neutral) effect on fish in the short to medium term; and a moderate beneficial significant effect (at the County or Unitary Authority scale) for some fish species in the long term due to the greater length of open channels available, as well as a more diverse and better quality habitat for fish. Confidence in this prediction is probable.

### *Indirect effects – disturbance to protected and notable fish from construction activities*

- 8.10.142 Scheme construction works have the potential to affect watercourses within and near the Scheme boundary, including effects associated with runoff from construction areas containing silt and other pollutants. Such discharges have the potential to have an adverse effect on any fish communities within these watercourses. The watercourse with greatest sensitivity for fish is Dam Brook due to the confirmed presence of brook lamprey and other notable species. In the absence of mitigation, the Scheme has the potential to result in a moderate adverse significant effect (at the County or Unitary Authority level) on fish. However, as detailed in Section 8.9, water pollution prevention control measures would be implemented during the construction phase via the CEMP (refer to the OEMP in Appendix 2.1 [TR010022/APP/6.3]), thereby minimising potential impacts on fish. With the implementation of these measures, it is considered that there would be a non-significant (neutral) effect on fish communities in Dam



Brook (or any other watercourses). Confidence in this prediction is certain/near-certain.

### **Operational effects**

#### ***International and European designated sites***

8.10.143 As detailed in Appendix 8.2: Habitat Regulations Assessment – No Significant Effects Report [TR010022/APP/6.3], the Scheme would not have any direct or indirect impacts on International and European designated sites during Scheme operation. As such, there would be no significant (neutral) effect upon international/European designated sites during Scheme operation. Confidence in this prediction is certain/near-certain.

#### ***National and local statutory designated sites***

*Indirect effects - disturbance through surface water run-off, noise, air quality*

8.10.144 Scheme operation would have a non-significant (neutral) effect on national and local statutory designated sites given that (prediction confidence is up to certain/near certain):

- Scheme runoff would be appropriately managed in accordance with the Road Drainage Strategy (Appendix 13.4 [TR010022/APP/6.3] – also refer to Chapter 13: Road Drainage and the Water Environment) which would avoid potential indirect impacts upon the Darley and Nutwood LNR located downstream of the Scheme.
- None of the national and local designated sites located within 2km of the Scheme have qualifying features sensitive to noise disturbance. Additionally, all national and local statutory designated sites are located >200m from the operational Scheme and not anticipated to be affected by changes in air quality and emissions from operational traffic.

#### ***Non-statutory designated sites***

*Indirect effects - potential change in hydrology impacting the inundation, drawdown zone in Alfreton Road Rough Grassland LWS*

8.10.145 Scheme operation would have a non-significant (neutral) effect on Alfreton Road Grassland LWS (prediction confidence is certain/near-certain) given that:

- Scheme runoff would be appropriately managed in accordance with the Road Drainage Strategy (Appendix 13.4 [TR010022/APP/6.3] – also refer to Chapter 13: Road Drainage and the Water Environment).
- The Scheme is not anticipated to significantly change the amount of water accumulating on the site, as the main source of water is considered to be overspills from Dam Brook and Watermeadows Ditch.

*Indirect effects - disturbance and damage through surface water run-off and salt spray*

8.10.146 The Markeaton Brook System LWS, Markeaton Park LWS, Bramble Brook and Margins LWS, Mickleover Railway Cutting LWS, The River Derwent LWS, Alfreton Road Rough Grassland LWS, Watermeadows Ditch LWS and Nooney's Pond LWS are located adjacent to the Scheme or have water dependant habitats within 2km downstream of the Scheme. Darley Park LWS is located downstream

of the Scheme adjacent to the River Derwent; however, this is not designated for water dependent habitats.

8.10.147 Scheme operation would have a non-significant (neutral) effect on these non-statutory designated sites given that (prediction confidence is up to certain/near-certain):

- Scheme runoff would be appropriately managed in accordance with the Road Drainage Strategy (Appendix 13.4 [TR010022/APP/6.3] – also refer to Chapter 13: Road Drainage and the Water Environment).
- Applications of rock salt during winter months would adhere to the relevant standards and guidance, and application rates in Highways England guidelines. While initial concentrations of de-icing agent on the carriageway would be high, this would rapidly become diluted following rain events or snow melts, with runoff concentrations being further diluted within the highway drainage attenuation features. Saltwater spray impacts upon vegetation are anticipated to be limited to <5m from the road (Kimura, 2006).

*Indirect effects - disturbance from operational traffic noise and air emissions*

8.10.148 None of the sites scoped into the assessment have qualifying features noted in their designation to be sensitive to noise disturbance. However, noise impacts upon protected and notable species identified at these sites (where applicable) are considered separately in the species sections below.

8.10.149 Table 8.17 summarises the non-statutory designated sites located within 200m of the Scheme and indicates the presence of habitats potentially sensitive to changes in air quality, primarily nitrogen deposition (where applicable). Traffic emits oxides of nitrogen (NO<sub>x</sub>) which can then be deposited on vegetation as nitrogen. Nitrogen deposition can change species composition, reduce species richness and increase plant production, with the greatest impact being on nutrient poor ecosystems and species (such as lichens and bryophytes). Appropriate critical load values for nitrogen deposition are also given in Table 8.17 as based on reference to the sensitivities of the most appropriate habitats on the Air Pollution Information System (APIS, 2018).

**Table 8.17: Summary of non-statutory designated sites located within 200m of the Scheme and presence of habitats potentially sensitive to changes in air quality**

Non-statutory designated site	Location	Reason for designation	Sensitive habitat(s) to nitrogen deposition	Minimum critical load
Bramble Brook and Margins LWS	Adjacent to the Scheme boundary at Kingsway junction	Secondary broadleaved woodland	Woodland	10kgN/ha/yr
Mickleover Railway Cutting LWS	Adjacent to the Scheme boundary continuing up to 0.8km west of the Scheme boundary at Kingsway junction	Habitat mosaic	Woodland	10kgN/ha/yr
Markeaton Park	Directly adjacent to the	Wood	Woodland	10kgN/ha/yr

Non-statutory designated site	Location	Reason for designation	Sensitive habitat(s) to nitrogen deposition	Minimum critical load
LWS	north and west of the Scheme boundary at Markeaton junction	pasture and Parks including veteran trees (BAP habitat – wood pasture)		
Markeaton Brook System LWS	Within the Scheme boundary continuing up to 0.8km south-east of the Scheme boundary and 1.2km north of the Scheme boundary	Invertebrate assemblage (including white clawed crayfish)	None	N/A
Alfreton Road Grassland LWS	Within the Scheme boundary at Little Eaton junction	Floodplain grassland semi-improved	None	N/A
The River Derwent LWS	Adjacent to the Scheme boundary at Little Eaton junction	Flowing water, river and associated streams	None	N/A

8.10.150 IAN 174/13 (Highways Agency, 2013) states that where the difference in NO<sub>x</sub> concentrations is less than 0.4µg/m<sup>3</sup>, then the change at ecological receptors is imperceptible and can be scoped out of the judgement of significance. Where the change would exceed 0.4µg/m<sup>3</sup>, nitrogen deposition rates should be calculated to determine whether they exceed 1% of the critical load for the relevant habitat. This is because the critical level for NO<sub>x</sub> is generic, whereas the nitrogen critical loads are specific to habitats. This is the approach used for designated sites only.

8.10.151 The air quality assessment as presented in Chapter 5: Air Quality has confirmed the change in nitrogen deposition and nitrogen oxides from operational traffic at non-statutory designated sites would not be significant.

8.10.152 Given the above, Scheme operation would have a non-significant (neutral) effect on non-statutory designated sites due to changes in noise and air quality. Confidence in the prediction is certain/near-certain.

### **Non-designated sites**

#### *Indirect effects - disturbance through surface water run-off and salt spray*

8.10.153 Non-designated sites with water dependant habitats located within 2km downstream of the Scheme are the Old Derby Canal, Marsh Area Breadsall PLWS, Holme Nook Ponds PLWS, and Haslams Lane Brook course. Other non-designated sites located within or adjacent to the Scheme are A38 Scrub Other Site of Interest, Ford Lane Other Site of Interest, Des Lane Brook Course; Plantation site of interest; and Boosemoor Brook.

8.10.154 Scheme operation would have a non-significant (neutral) effect on these non-designated sites given that (prediction confidence is certain/near-certain):

- Scheme runoff would be appropriately managed in accordance with the Road Drainage Strategy (Appendix 13.4 [TR010022/APP/6.3] – also refer to Chapter 13: Road Drainage and the Water Environment).
- Applications of rock salt during winter months would adhere to the relevant standards and guidance, and application rates in Highways England guidelines. While initial concentrations of de-icing agent on the carriageway would be high, this would rapidly become diluted following rain events or snow melts, with runoff concentrations being further diluted within the highway drainage attenuation features. Saltwater spray impacts upon vegetation are anticipated to be limited to <5m from the road (Kimura, 2006).

*Indirect effects - disturbance from operational traffic noise and air emissions*

8.10.155 None of the non-designated sites scoped into the assessment have qualifying features noted in their designation to be sensitive to noise disturbance. However, noise impacts upon protected and notable species identified at these sites (where applicable) is considered in the species sections below.

8.10.156 Table 8.18 summarises the non-designated sites located within 200m of the Scheme, the presence of habitats potentially sensitive to changes in air quality, and appropriate critical load values for nitrogen deposition based on reference to the sensitivities of the most appropriate habitats on the Air Pollution Information System (APIS, 2018).

**Table 8.18: Summary of non-designated sites located within 200m of the Scheme and presence of habitats potentially sensitive to changes in air quality**

Non-designated site	Location	Reason for designation/ notes from surveys	Sensitive habitat(s) to nitrogen deposition	Minimum critical load
Land off Kingsway PLWS	Approx. 0.2km east of the Scheme boundary at Kingsway junction	Running water (small pond no longer present)	None	N/A
A38 Scrub Other Site of Interest	Within the Scheme boundary at Little Eaton junction	Plantation woodland (no notable woodland flora interest)	Woodland	10kgN/ha/yr
Ford Lane Other Site of Interest	Within the Scheme boundary at Little Eaton junction	Tall ruderal habitat	None	N/A
Des Lane Brook Course	To the west of the Scheme boundary at Little Eaton junction	Open water habitat	None	N/A
Plantation site of interest	Adjacent to the Scheme boundary at Little Eaton junction	Plantation woodland	Woodland	10kgN/ha/yr

Non-designated site	Location	Reason for designation/ notes from surveys	Sensitive habitat(s) to nitrogen deposition	Minimum critical load
Boosemoor Brook	Adjacent to the east of the Scheme boundary at Little Eaton junction	Open water habitat	None	N/A
Old Derby Canal	Adjacent to the south of the Scheme boundary at Little Eaton junction	Open water habitat	None	N/A
Marsh Area Breadsall PLWS	Approx. 0.2km south of the Scheme boundary at Little Eaton junction	Marsh	None	N/A

8.10.157 The air quality assessment as presented in Chapter 5: Air Quality has confirmed that the change in nitrogen deposition and nitrogen oxides from operational traffic at non-designated sites would not be significant.

8.10.158 Given the above, Scheme operation would have a non-significant (neutral) effect on non-designated sites. Confidence in the prediction is certain/near-certain.

### **Habitats**

*Indirect effects - disturbance to watercourses and damage and disturbance to habitats from salt spray and air emissions*

8.10.159 Scheme operation would have a non-significant (neutral) effect on habitats in proximity of the Scheme, and nearby habitat given that (prediction confidence is probable):

- Scheme runoff would be appropriately managed in accordance with the Road Drainage Strategy (Appendix 13.4 [TR010022/APP/6.3] – also refer to Chapter 13: Road Drainage and the Water Environment).
- Applications of rock salt during winter months would adhere to the relevant standards and guidance, and application rates in Highways England guidelines. While initial concentrations of de-icing agent on the carriageway would be high, this would rapidly become diluted following rain events or snow melts, with runoff concentrations being further diluted within the highway drainage attenuation features. Saltwater spray impacts upon vegetation are anticipated to be limited to <5m from the road (Kimura, 2006).
- Habitats across the Scheme potentially sensitive to nitrogen deposition are primarily woodland habitats. Change in levels of nitrogen deposition from operational traffic is, however, not considered to be significant (refer to Chapter 5: Air Quality).

### **Toads**

*Indirect effects - disturbance from surface water run-off*

8.10.160 Given the management of highway runoff in accordance with the Road Drainage Strategy (Appendix 13.4 [TR010022/APP/6.3] – also refer to Chapter 13: Road Drainage and the Water Environment), Scheme operation would have a non-

significant (neutral) effect on the population of toads within the Markeaton catchment. Confidence in this prediction is certain/near-certain.

*Direct effects - risk of mortality from collision with motor vehicles*

- 8.10.161 There is no known or registered toad crossing point at the A38 near Markeaton Lake and Mill Pond and thus the risk of toads crossing the road at this location is low (Froglife, 2019). The culverts under the A38 connecting Markeaton Lake with Mill Pond and Middle Brook would be retained and would thus maintain existing habitat links for toads. The Scheme kerb design would allow amphibians to bypass gully gratings minimising the risks of them getting trapped if they did follow the kerb of the road (Highways Agency, 2001). It is, therefore, considered that Scheme operation would have a non-significant (neutral) effect on the population of toads within the Markeaton catchment as a result of risk mortality from collision with motor vehicles. Confidence in this prediction is certain/near-certain.

***Breeding and Wintering birds***

*Direct effects - risk of mortality to foraging and commuting barn owl due to collision with road traffic*

- 8.10.162 Barn owls were not found to be nesting on or within proximity to the Scheme at Little Eaton junction. However, barn owl is known to be present in the wider area. The dense shelterbelt planting to the east of the new A38 embankment (refer to the landscape design drawing Figure 7.8c [TR010022/APP/6.2]), together with the installation of the noise and screening barriers (refer to the Environmental Masterplans in Figures 2.12e to 2.12g [TR010022/APP/6.2]) would benefit local barn owls and ensure that any individual barn owls that may want to cross the Scheme would be encouraged to increase their flight height across the road and thus reduce the risk of collision with road traffic. With the provision of such measures, Scheme operation would have a non-significant (neutral) effect on barn owl. Confidence in this prediction is certain/near certain.

*Direct and indirect effects - risk of mortality of the notable farmland bird assemblage, nesting lapwing, potential nesting little ringed plover and oystercatcher, and wintering birds due to collision with road traffic, and reduced bird population sizes and breeding success due to traffic noise and disturbance*

- 8.10.163 Scheme operation would have a non-significant (neutral) effect on the notable farmland bird assemblage, nesting lapwing, potential nesting little ringed plover and oyster catcher, and wintering birds during Scheme operation (prediction confidence is probable) given:

- The Scheme would be provided with a new shelterbelt planted along the southern and eastern edges of the new A38 embankment at Little Eaton junction (refer to Figure 7.8c [TR010022/APP/6.2]). This shelterbelt would screen birds which are using, and potentially nesting in, these surrounding habitats. The shelterbelt together with the installation of the noise and screening barriers (refer to the Environmental Masterplans in Figures 2.12e to 2.12g [TR010022/APP/6.2]) would encourage any birds wishing to cross the road to increase their flight height across the road and thus reduce the risk of collision with road traffic.

- The noise assessment indicates that with the installation of the noise and screening barriers at Little Eaton junction, adverse noise impacts upon the habitats to the south and east of the Scheme would be avoided.

***Bats – roosting and foraging and commuting***

*Direct effects - risk of bat mortality through collision with motor vehicles (all species)*

8.10.164 There is a known bat flyway across the A38 at Markeaton junction and thus widening of the A38 in this location has the potential to negatively impact bats, potentially resulting in bat mortality through collision with motor vehicles causing up to a moderate adverse significant effect (without mitigation). This is the only location where bats were noted as crossing the A38 during surveys.

8.10.165 Replacement roosts have, however, been carefully sited to reduce the risks of bat mortality through collision with motor vehicles as follows:

- **██████████ at Markeaton junction:** The translocation of known roosting features and the installation of the eco rocket would be undertaken within the same woodland parcel as the noctule roost which is greater than 50m from the A38.
- **B8-QW30 building at Markeaton junction:** Replacement roosting features along sections of the noise barrier at the Royal School for the Deaf would be installed on the side facing away from the road.
- **B2 flood arch bridge:** Mitigation includes the installation of three bat boxes into the bridge structure to replace those features lost.

8.10.166 The like-for-like replacement footbridge at Markeaton junction would continue to act as a potential navigational cue for bats crossing the A38. Additionally, dense and interspersed planting incorporated into the landscape design would assist bats to use the flyway across the A38 at Markeaton junction (refer to Figure 7.8b [TR010022/APP/6.2]). In addition, the landscape design at Little Eaton junction includes dense shelter belts of trees which would also encourage hop-overs for bats to fly up and over the new A38, as would the noise and screening barriers (refer to the Environmental Masterplans in Figures 2.12e to 2.12g [TR010022/APP/6.2]).

8.10.167 Taking into account the mitigation proposed, Scheme operation would have a non-significant (neutral) effect on bats (roosting, foraging and commuting) as a result of risk of mortality through collision with motor vehicles. Confidence in the prediction is probable.

*Indirect effects - disturbance on bats from operational lighting and noise (all species)*

8.10.168 Without appropriate mitigation and given the existing bat activity in the vicinity of the Scheme, there is potential for a moderate adverse significant effect on bats due to the lighting and noise during Scheme operation. However, operation phase Scheme effects would be reduced through the following actions, such that there would be a non-significant (neutral) effect on bats (roosting, foraging and commuting) from lighting and noise (prediction confidence is certain/near certain):

- As detailed in Section 8.9, whilst lighting would be required at all three junctions, the lighting proposals have been reviewed against the guidance provided by IAN 116/08 (Highways Agency, 2008) and by the Institute of Lighting (2018) regarding minimising lighting risks to bats. It is considered that the lighting strategy would minimise impacts on foraging, commuting and roosting bats given the use of LED luminaires, with lighting being directed to where it is needed to minimise horizontal light spillage, whilst upward lighting would be minimal. In addition, there would be no illumination of any roost entrances and associated flightpaths or on habitats and features with known bat activity hot spots (which includes Mackworth Park, Markeaton Park and Markeaton footbridge, the River Derwent (north and south of the A38; in association with the A38 Scrub Other Site of Interest), and to the north of B2 Flood Arch Bridge). In addition, no lighting columns would be placed along the new A38 mainline at Little Eaton junction.
- Noise has the potential to cause displacement of bats from roosts or can interfere with bats trying to locate their prey in different habitat conditions (as noise can mask their echolocation). Given the existing noise climate near the existing A38, it is concluded that bats within the vicinity of the Scheme are already adapted to high levels of traffic noise. The results of the noise assessment presented in Chapter 9: Noise and Vibration indicates that noise levels during Scheme operation would increase and decrease along the new A38 alignment, although noise effects would be reduced through the inclusion of noise barriers between Kingsway junction and Markeaton junction, an approximate 4m high noise barrier along the Scheme boundary with the Royal School for the Deaf at Markeaton junction as well as noise and screening barriers at Little Eaton junction (refer to the Environmental Masterplans as presented in Figures 2.12a to 2.12h [TR010022/APP/6.2]). In addition, the installation of three bat features within the concrete structure of the Flood Arch bridge at Little Eaton junction would assist bats acoustically (and thermally) at that location (Caltrans, 2016). The translocation and installation of bat roost features within the retained woodland at Markeaton junction (G361\*) would be within an area of negligible noise change.

### **Badger**

#### *Direct effects - risk of mortality to badger through collision with motor vehicles*

8.10.169 Without mitigation, the Scheme has the potential to have a slight non-significant adverse effect (at the Local scale) on badgers due to risks of mortality through collision with motor vehicles. Badger fencing is, therefore, proposed to be installed at Kingsway junction and at Little Eaton junction (refer to the Environmental Masterplans as presented in Figures 2.12a/b and Figure 2.12e to 2.12g [TR010022/APP/6.2]). Fencing would be beneficial for the local badger population and traffic by reducing the risk of badgers crossing the road. With the implementation of badger fencing at Kingsway junction and Little Eaton junction, it is considered that the Scheme would have a slight non-significant beneficial effect (at the Local scale) on badgers during Scheme operation. Confidence in this prediction is probable.



*Indirect effects - disturbance to badgers through increased flood events at Little Eaton junction*

8.10.170 It is considered that any changes in flooding patterns associated with the River Derwent would not have a significant impact on badgers given that badgers already adapt their movements to flooding and use setts dependent on the existing ground conditions. Therefore, it is considered that there would be a non-significant (neutral) effect on badgers due to disturbance through changes in flooding patterns at Little Eaton junction during Scheme operation. Confidence in this prediction is certain/near certain.

**Hedgehogs**

8.10.171 Scheme operation is considered to have no potential to directly or indirectly impact upon hedgehogs.

**Otter**

*Direct effects - risk of mortality from collision with motor vehicles*

8.10.172 There are no records of otter being found on the A38 from desk study information. It is considered that there is no requirement for mammal ledges to be installed within the Scheme culvert designs. At Kingsway junction, the length of Bramble Brook that would be culverted already connects to a lengthy culvert which extends below Derby. Additionally, at Little Eaton junction the Dam Brook realignment works would create additional open channel that could be used by otters already present in the area. The unnamed tributary to be culverted near Dam Brook would not connect optimal otter habitat, or known otter foraging and commuting routes. Given the otter use of the area, it is considered that there is no requirement for permanent otter fencing to be installed along the Scheme. The purpose of otter fencing is to direct otters away from roads to alternative crossing routes within their home range (Highways Agency, 2001) – this is not considered to be applicable for the Scheme. Overall, it is considered that there would be a non-significant (neutral) effect on otters as a result of risk of mortality from collision with motor vehicles during Scheme operation. Confidence in this prediction is certain/near-certain.

*Indirect effects - disturbance to otter from surface water-run off (affecting food resources) and traffic noise*

8.10.173 Scheme operation would have no significant (neutral) effect on foraging and commuting otters due to disturbance given that (prediction confidence is certain/near-certain):

- Scheme runoff into local watercourses would be appropriately managed in accordance with the Road Drainage Strategy (Appendix 13.4 [TR010022/APP/6.3] – also refer to Chapter 13: Road Drainage and the Water Environment).
- There are no otter holts identified on, or with proximity, to the Scheme which would be affected by operational noise.

**Terrestrial invertebrates**

8.10.174 Scheme operation is considered to have no potential to directly or indirectly impact upon terrestrial invertebrates.

### ***Aquatic invertebrates and fish***

#### *Direct effects - risk of mortality through surface water run-off*

8.10.175 Scheme operation would have no significant (neutral) effect on macroinvertebrate communities or fish in watercourses near the Scheme given that (prediction confidence is probably):

- Scheme runoff would be appropriately managed in accordance with the Road Drainage Strategy (Appendix 13.4 [TR010022/APP/6.3] – also refer to Chapter 13: Road Drainage and the Water Environment).
- Applications of rock salt during winter months would adhere to the relevant standards and guidance, and application rates in Highways England guidelines. While initial concentrations of de-icing agent on the carriageway would be high, this would rapidly become diluted following rain events or snow melts, with runoff concentrations being further diluted within the highway drainage attenuation features.

## **8.11 Ecosystems and no net loss in biodiversity**

8.11.1 An ecosystem is a dynamic complex of plant, animal and micro-organism communities (biotic) and their non-living (abiotic) environment interacting as a functional unit. Based on the likely residual effects associated with the key biotic (important biodiversity features) from the direct and indirect impacts associated with Scheme construction and operation as detailed in Section 8.10, it is considered that the Scheme is unlikely to result in an adverse impact to the integrity or function of any of the local ecosystems.

8.11.2 The Scheme would result in the creation or reinstatement of approximately 36.56ha of semi-natural habitats as part of the landscape design (refer to the landscape design drawings Figures 7.8a to 7.8c [TR010022/APP/6.2]). Over time, the habitats that would be provided by the Scheme (and eradication and management on invasive non-native plant species) have the potential to enhance the local natural environment and generate an overall no net loss and potentially net gain for biodiversity, as well as establish coherent ecological networks that are more resilient to current and future pressures. Such benefits would be limited at the year of Scheme opening, due to the early stage of habitat development, but are expected to increase annually up to the assessment year (15 years after Scheme opening) and beyond under appropriate management. Thus, these benefits would contribute to Highways England Biodiversity Plan of reducing no net loss by 2020, and potentially delivering net gain by 2040.

8.11.3 Chapter 7: Landscape and Visual Impact Assessment refers to ‘green wedges’, which are open areas around and between settlements that maintain a distinction between the countryside and built up areas. The designation of green wedges is non-statutory but is intended to provide an additional layer of protection to areas where it is considered development pressure exists and are noted to have some ecological value (as detailed within the Derby City Local Plan – DCiC (2017)). Existing green wedges are located within and adjacent to the Scheme boundary and the landscape design has aimed to retain and integrate these areas into the Scheme landscaping proposals (refer to Figures 7.8a to 7.8c [TR010022/APP/6.2]). This approach, together with the integration of open spaces, retained habitats, and ecology mitigation design features that have the

potential to deliver no net loss, would provide a network of natural space and green corridors that would preserve and potentially enhance ecosystem functions near the Scheme. Other features that have the potential to generate biodiversity gains include the use of the noise barrier at Markeaton junction for bat mitigation; provision of bat roost features within the Flood Arch bridge at Little Eaton junction, provision of badger fencing, and the creation of additional sections of open channel and ecological habitats associated with the Dam Brook realignment works.

- 8.11.4 In addition, as detailed in para. 8.5.10, Highways England is exploring biodiversity restoration and enhancement opportunities at Markeaton Park, Mill Ponds and at the Ford Lane Site of Interest. Such works may be delivered via Designated Funds and thus do not form part of the Scheme. Such aspirational enhancement opportunities would further benefit ecosystem services and the green infrastructure corridor characteristics of the Scheme.

## 8.12 Monitoring

### Monitoring of significant effects

- 8.12.1 Monitoring is only proposed where it is necessary to manage residual effects on biodiversity features of importance.
- 8.12.2 Section 8.10 indicates that the Scheme has the potential to have moderate adverse significant effects (at the County or Unitary Authority scale), which are significant in EIA terms (refer to Table 8.4), on the following ecological features:
- A38 Roundabout LWS: moderate significant adverse effect during Scheme construction due to 100% loss of the designated site.
  - Woodland: up to moderate adverse significant effect in the short to medium term during Scheme construction until habitat establishes (thereafter, a non-significant (neutral) effect in the long term).
- 8.12.3 Given that the A38 Roundabout LWS would be removed by the Scheme and given that the landscape planting to be provided by the Scheme would result in effects on woodland reducing to a non-significant (neutral) effect in the long term, monitoring of these significant effects is not considered to be necessary. As other biodiversity significant residual effects have been assessed as less than moderate adverse (less than County or Unitary Authority scale), or non-significant in EIA terms (refer to Table 8.4), monitoring of such effects is not considered to be necessary.

### General biodiversity monitoring

- 8.12.4 Whilst monitoring of significant effects is not considered to be necessary, a programme of ecological monitoring would still be needed during the following phases of the Scheme, which in turn would enhance confidence in the prediction of biodiversity effects:
- 12-month period prior to construction.
  - Monitoring during Scheme construction (as specified in the OEMP – refer to Appendix 2.1 [TR010022/APP/6.3]).
  - 5-year aftercare period following completion of Scheme construction (as detailed within the HEMP which would contain essential environmental

information needed by the body responsible for the future Scheme maintenance and operation).

8.12.5 Monitoring details as presented in the sections below.

#### **Pre-construction monitoring**

8.12.6 The monitoring programme prior to Scheme construction would focus on the presence of mobile statutorily protected and notable species, including bats, badgers, water voles (refer to para. 8.9.10), otters, birds (particularly with regards to Schedule 1 species, which are additionally protected from disturbance when nesting, as well as nest damage and destruction, under the Wildlife and Countryside Act 1981), and non-native invasive plant species to identify any significant changes in distribution or status local to the Scheme. The results of the monitoring would enable modification of the environmental design or construction and mitigation programmes where necessary to help minimise any unexpected impacts that are encountered. A feedback mechanism would be implemented to ensure results of monitoring surveys are taken account of within the detailed design for the Scheme (where applicable).

#### **Construction monitoring**

8.12.7 Ecological monitoring during the Scheme construction phase would include:

- Species rich semi-improved grassland: including monitoring of the new species rich grassland created within Markeaton Park to mitigate for the loss of the A38 Roundabout LWS.
- Woodland: monitoring to assess the success of habitat establishment in the long term.
- Standing water and running water: monitoring to assess the success of habitat establishment in the long term.
- Other habitat standard monitoring surveys as per the CEMP and HEMP: monitoring to assess the success of habitat establishment.
- Bird monitoring surveys: to monitor the effectiveness of temporary barriers during construction on the farmland bird assemblage, lapwing potential nesting little ringed plover and oyster catcher and wintering bird assemblage; and assess the success of habitat establishment.
- Bat monitoring surveys: monitoring as per NE licences for bat roosts to assess the success of habitat establishment for foraging and commuting bats.
- Badger monitoring surveys: monitoring to identify any new setts and assess the success of habitat establishment.
- Otter monitoring surveys (particularly in association with the Bramble Brook and Dam Brook diversions): monitoring to assess the success of habitat establishment.
- Terrestrial invertebrate monitoring surveys: to assess the success of habitat establishment of the species-rich grassland areas.
- Aquatic invertebrate monitoring surveys: to assess the success of habitat establishment (particularly the Bramble Brook and Dam Brook diversions).

- Fish monitoring surveys: to monitor the success of habitat establishment at Dam Brook.
- Standard monitoring as per the CEMP: monitoring to assess effectiveness of water pollution prevention control measures and standard best practice measures to control construction dust.

### **Operational monitoring**

8.12.8 During the Scheme operational phase, ecological monitoring is anticipated of the following:

- Markeaton Brook System LWS: monitoring to inform the on-going maintenance regime.
- Habitat monitoring surveys within the landscaped areas (including woodland and species-rich grassland areas) and watercourses with direct runoff from the highway including attenuation features: monitoring to inform the on-going maintenance regime.
- Bird monitoring surveys: monitoring to assess the effectiveness of the shelterbelt at Little Eaton junction and inform the on-going maintenance regime.
- Badger monitoring surveys: monitoring to assess the effectiveness of the fencing and inform the on-going maintenance regime.
- Bat monitoring surveys: monitoring to assess the continued occupation of roosts within the highway boundary and to inform the on-going maintenance regime.
- Aquatic invertebrate and fish surveys as part of the watercourse monitoring surveys: monitoring to inform the on-going maintenance regime.

8.12.9 Monitoring would enable any remedial action to be taken, including adjustment to the activity generating the impacts and adjustment to the mitigation measures (where applicable).

## **8.13 Summary of assessment**

8.13.1 A summary of moderate or above significant biodiversity effects (at the County or Unitary Authority level or above), referred to as significant effects in EIA terms, is provided in Table 8.19. A summary of all effects, significant and non-significant effects in EIA terms, is provided in Appendix 8.20 [TR010022/APP/6.3].

8.13.2 Table 8.19 indicates that the only significant effects on biodiversity during the Scheme construction phase in the long-term would be effects upon the A38 Kingsway Roundabout LWS. The significance of effect on the A38 Kingsway Roundabout LWS would be a moderate adverse significant effect (at the County or Unitary Authority scale) due to the complete permanent loss of this LWS.

8.13.3 Given the implementation of the mitigation features as detailed in Section 8.9, there is potential for there to be up to a moderate beneficial significant effect (at the County or Unitary Authority scale) on biodiversity in the medium to long term; particularly on standing water (ponds), running water, foraging and commuting bats, otter, terrestrial invertebrates, aquatic invertebrates and fish. This would be achieved through the implementation of mitigation measures and the taking of

opportunities for biodiversity gains, including the retention, protection and creation of ecological habitats together with associated features for protected and notable species. Potential biodiversity gains would be delivered via the use of Markeaton Park for translocation of species-rich grassland, Mackworth Park for the incorporation of bat and bird box mitigation; the new Dam Brook alignment and associated wildlife ponds which would benefit riparian mammals, foraging and commuting bats, aquatic invertebrates, fish and wintering birds. The defined mitigation approach of the Scheme, therefore, has the potential to deliver a no net loss, and potentially net gain, in biodiversity.

- 8.13.4 There are considered to be no significant adverse (neutral) effects on biodiversity during Scheme operation. Rather, the protection of fauna in the long term has the potential to have slight beneficial non-significant effect (at the Local Scale) on biodiversity, particularly on badgers through the implementation of permanent badger fencing.

**Table 8.19: Summary of significant biodiversity effects**

Note: The EIA definition of a significant biodiversity effect is: a 'moderate or greater' adverse or beneficial significant effect (at the County or Unitary Authority scale or above) on an important biodiversity feature (refer to Table 8.4) (A summary of all effects, significant and non-significant effects in EIA terms, is provided in Appendix 8.20 [TR010022/APP/6.3]).

Designated and non-designated sites/habitats/species	Ecological feature	Importance of ecological feature	Kingsway & Markeaton junctions	Little Eaton junction	Impact description	Design (embedded) and additional mitigation measures (refer to Section 8.9)	Characterisation of the mitigated impact on the ecological feature <sup>32</sup>	Significance of residual effect
<b>Construction phase</b>								
Non-statutory designated sites	A38 Roundabout LWS	County or Unitary Authority	✓	*	Habitat loss	Translocation and appropriate planting of species-rich grassland in Markeaton Park.  Best practice construction methods as detailed in the CEMP.	SI: Negative PO: Certain/Near Certain CO: Direct EC: Approximately 3.8ha of habitat lost (100% of the LWS lost; approximately 0.28ha (approximately 7%) of the LWS is species rich grassland which the site is designated). Approximately 0.28ha of the species rich grassland lost to be mitigated. SZ: As above <sup>33</sup> RE: Permanent	Moderate significant adverse effect  <i>Confidence:</i> Certain/near-certain

<sup>32</sup> SI (Sign): PO (Probability): CO (Complexity): EC (Extent): SZ (Size i.e. Magnitude): RE (Reversibility): DU (Duration): TF (Timing and Frequency)

<sup>33</sup> When the ecological feature being considered is habitat itself, size (magnitude) and extent may be synonymous

Designated and non-designated sites/habitats/species	Ecological feature	Importance of ecological feature	Kingsway & Markeaton junctions	Little Eaton junction	Impact description	Design (embedded) and additional mitigation measures (refer to Section 8.9)	Characterisation of the mitigated impact on the ecological feature <sup>32</sup>	Significance of residual effect
							DU: Long-term TF: Potential for nesting birds and terrestrial invertebrates (see below). Sensitive timing to be considered when undertaking habitat removal.	
Woodland	Semi-natural broadleaved woodland	Up to County or Unitary Authority	✓	✗	Habitat loss	The Scheme design minimises loss of woodland trees. Woodland to be planted as part of the landscape design would be native broadleaved woodland; with incorporation of a suitable high-quality flora understory, including retention of felled trees as features.	SI: Negative PO: Probable CO: Direct EC: Approximately 0.82ha lost; however approximately 6.4ha of new woodland to be planted across the Scheme. SZ: As above RE: Temporary and permanent DU: Short term and long term TF: Sensitive timing to be considered when removing in relation to nesting birds and potential for roosting bats.	Moderate significant adverse effect in the short to medium term <sup>34</sup> Non-significant (neutral) in the long term <i>Confidence:</i> Probable (certain/near certain with monitoring implemented through CEMP and HEMP)

<sup>34</sup> 'Short term' in regards to woodland is considered to be in the region of 5 to 10 years; 'medium term' 10 to 15 years; and 'long term' >15 years.



Designated and non-designated sites/habitats/species	Ecological feature	Importance of ecological feature	Kingsway & Markeaton junctions	Little Eaton junction	Impact description	Design (embedded) and additional mitigation measures (refer to Section 8.9)	Characterisation of the mitigated impact on the ecological feature <sup>32</sup>	Significance of residual effect
Running water	Dam Brook	Up to County or Unitary Authority	*	✓	Habitat loss	Dam Brook channel would be realigned within a new more sinuous channel, resulting in a net gain in open channel of approximately 197m. Ecology ponds and highway runoff attenuation ponds would also improve the riparian zone of the channel.	SI: Positive PO: Probable CO: Direct EC: Loss of approximately 279m of open channel, however, approximately 260m of new flood alleviation channel and approximately 216m of new swale. Net gain in open channel of approximately 197m. SZ: As above RE: Temporary and permanent DU: Short term and long-term TF: Potential for otter. Sensitive timing to be considered when undertaking habitat removal	Slight non-significant adverse effect in the short-term <sup>35</sup> Moderate significant beneficial effect in the medium to long term  <i>Confidence:</i> Probable (certain/near certain with monitoring implemented through CEMP and HEMP)

<sup>35</sup> 'Short term' for watercourses is considered to be in the region of 1 to 2 years; 'medium term' 2 to 5 years; and 'long term' >5 years.

Designated and non-designated sites/habitats/species	Ecological feature	Importance of ecological feature	Kingsway & Markeaton junctions	Little Eaton junction	Impact description	Design (embedded) and additional mitigation measures (refer to Section 8.9)	Characterisation of the mitigated impact on the ecological feature <sup>32</sup>	Significance of residual effect
Otter	A population of otter across the Scheme (at Little Eaton junction)	County or Unitary Authority	*	✓	Habitat loss – Dam Brook	The existing channel would be retained until the new realigned channel has been constructed at Dam Brook. The Dam Brook realignment would be enhanced.	SI: Positive PO: Probable CO: Direct EC: Loss of approximately 279m of open channel; however approximately 260m of new flood alleviation channel and approximately 216m of new swale. Net gain in open channel of approximately 197m. SZ: As above RE: Temporary and permanent DU: Short term and long-term TF: N/A	Not significant (neutral) short to medium term <sup>36</sup> Moderate significant beneficial in the long term  <i>Confidence:</i> Probable (certain/near certain with monitoring implemented through CEMP and HEMP)

<sup>36</sup> As per watercourses, 'Short term' for aquatic invertebrates is considered to be in the region of 1 to 2 years; 'medium term' 2 to 5 years; and 'long term' >5 years.

Designated and non-designated sites/habitats/species	Ecological feature	Importance of ecological feature	Kingsway & Markeaton junctions	Little Eaton junction	Impact description	Design (embedded) and additional mitigation measures (refer to Section 8.9)	Characterisation of the mitigated impact on the ecological feature <sup>32</sup>	Significance of residual effect
Aquatic macro-invertebrates	An assemblage of aquatic macroinvertebrates recorded in Dam Brook.	County or Unitary Authority	*	✓	Habitat loss – Dam Brook	The proposed realignment and restoration of Dam Brook and the provision of additional habitat in the long term would benefit aquatic invertebrates.	SI: Positive PO: Probable CO: Direct EC: Loss of approximately 279m of channel; however approximately 260m of new flood alleviation channel and approximately 216m of new swale. Net gain in open channel of approximately 197m. SZ: As above RE: Temporary and permanent DU: Short term and long-term TF: N/A	Not significant (neutral) short to medium term <sup>37</sup> Moderate significant beneficial in the long term  <i>Confidence:</i> Probable (certain/near certain with monitoring implemented through CEMP and HEMP)

<sup>37</sup> As per watercourses, 'Short term' for aquatic invertebrates is considered to be in the region of 1 to 2 years; 'medium term' 2 to 5 years; and 'long term' >5 years.

Designated and non-designated sites/habitats/species	Ecological feature	Importance of ecological feature	Kingsway & Markeaton junctions	Little Eaton junction	Impact description	Design (embedded) and additional mitigation measures (refer to Section 8.9)	Characterisation of the mitigated impact on the ecological feature <sup>32</sup>	Significance of residual effect
Fish	A population of protected/notable species in Dam Brook (brook lamprey <i>Lampetra planeri</i> , bullhead <i>Cottus gobio</i> and brown trout <i>Salmo trutta</i> )	County or Unitary Authority	*	✓	Habitat loss – Dam Brook	<p>Translocation of fish from Dam Brook into a suitable receptor site prior to brook diversion works.</p> <p>Greater length of watercourse to be reinstated and the opportunity to restore a greater diversity and quality of fish habitat.</p> <p>Dam Brook WFD Assessment concluded that there would be no deterioration in the WFD status of the waterbody from the Scheme (refer to Appendix 13.3B [TR010022/APP/6.3]).</p>	<p>SI: Positive PO: Probable CO: Direct EC: Loss of approximately 279m of channel; however approximately 260m of new flood alleviation channel and approximately 216m of new swale. Net gain in open channel of approximately 197m. SZ: As above RE: Temporary and permanent DU: Short term and long-term TF: N/A</p>	<p>Not significant (neutral) short to medium term<sup>38</sup></p> <p>Moderate significant beneficial in the long term</p> <p><i>Confidence:</i> Probable (certain/near certain with monitoring implemented through CEMP and HEMP)</p>

<sup>38</sup> As per watercourses, 'Short term' for fish is considered to be in the region of 1 to 2 years; 'medium term' 2 to 5 years; and 'long term' >5 years.

Designated and non-designated sites/habitats/species	Ecological feature	Importance of ecological feature	Kingsway & Markeaton junctions	Little Eaton junction	Impact description	Design (embedded) and additional mitigation measures (refer to Section 8.9)	Characterisation of the mitigated impact on the ecological feature <sup>32</sup>	Significance of residual effect
<b>Operational phase</b>								
No likely significant adverse effects (some long-term effects as detailed within the construction phase section)								

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