

7 ECOLOGY AND NATURE CONSERVATION

7.1 Introduction

7.1.1 This chapter considers the likely significant effects on ecology and nature conservation associated with the construction and operation of the proposed development, as described in Chapter 2: Proposed Development Description.

7.1.2 The specific objectives of the chapter are to:

- describe the ecological baseline;
- describe the assessment methodology and significance criteria used in completing the impact assessment;
- describe the potential effects, including direct, indirect and cumulative effects on ecological features;
- describe the mitigation measures proposed to address likely significant effects; and
- assess the residual effects remaining following the implementation of mitigation.

7.1.3 This chapter has been completed by a suitably qualified Ramboll ecologist, Elizabeth Butler MSc and reviewed by Adam Fitchet MCIEEM.

7.1.4 The scope of the assessment has been informed by consultation responses summarised in Table 7.1 and follows the Chartered Institute of Ecology and Environmental Management (CIEEM) Ecological Impact Assessment (EcIA) guidelines¹.

7.1.5 This chapter refers to the following Technical Appendices (refer to Volume 3):

- Technical Appendix 7.1: Ecology Survey Results;
- Technical Appendix 7.2: Confidential Survey Results²; and
- Technical Appendix 7.3: Confidential Mitigation³.

7.1.6 This chapter refers to the following Figures (refer to Volume 4):

- Figure 7.1: Designated Sites;
- Figure 7.2a-b: Ancient Woodland Inventory;
- Figure 7.3: Phase 1 Habitats; and
- Figure 7.4: Target Notes.

7.1.7 Confidential figures are also referenced in this chapter where relevant and can be found in Technical Appendix 7.2 Volume 3 of this EIAR.

7.1.8 Technical Appendices 7.2 and 7.3 and the confidential figures include details of badger *Meles meles* setts and field sign locations. As badgers are particularly at risk from persecution, these will only be issued to the client directly and Scottish Natural Heritage (SNH) and must not be shared with the wider public.

7.2 Scope of Assessment

7.2.1 This chapter considers the effects on the following ecological features:

- Designated nature conservation sites;

¹ Chartered Institute of Ecology and Environmental Management (CIEEM), 2016. Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal. Winchester: CIEEM.

² Not available to the public.

³ Not available to the public.

- Habitats, such as peatlands, groundwater dependent terrestrial ecosystems (GWDTE) and ancient and semi-natural woodland, potentially affected by habitat loss and fragmentation; and
- Protected species (e.g. badger, bat species, reptiles and amphibians i.e great crested newt *Triturus cristatus*).

7.2.2 The scope of the assessment has also been informed by the following policy and legal framework:

- EC Directive on the Conservation of Natural Habitats and Wild Flora and Fauna, 92/43/EEC, 1992⁴;
- Directive 2009/147/EC of the European Parliament and of the Council of the 20th November 2009 on the Conservation of Wild birds⁵;
- The Wildlife and Countryside Act 1981 (as amended)⁶;
- The Protection of Badgers Act 1992⁷;
- The Conservation (Natural Habitats Etc.) Regulations 1994 (as amended)⁸;
- Nature Conservation (Scotland) Act 2004⁹;
- Wildlife and Natural Environment (Scotland) Act 2011¹⁰;
- UK Biodiversity Action Plan (UK BAP)¹¹;
- Scotland's Biodiversity: (A strategy for the conservation and enhancement of biodiversity in Scotland)¹²;
- West Lothian Local Biodiversity Action Plan (LBAP)¹³ and;
- Design Manual for Roads and Bridges (DMRB): Volume 11: Environmental Assessment¹⁴.

Scoping and Consultation

7.2.3 As presented in Technical Appendix 1.2: EIA Scoping Opinion in Volume 3, comments of relevance to this chapter were received from Scottish Natural Heritage (SNH) and Scottish Environment Protection Agency (SEPA). In summary, comments on the proposed scope of the assessment were positive and specific mention was made of the need to consider the potential effects on protected species and sensitive habitats.

7.2.4 SNH were content with the scope of ecological surveys for protected species (such as badger, bat species, water vole *Arvicola amphibius*, otter *Lutra lutra* and great crested newt (GCN)

⁴ Department for Environment, Food and Rural Affairs (Defra), 2001. European Community Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora. First report by the United Kingdom under Article 17 on implementation of the Directive from June 1994 to December 2000. Defra Bristol.

⁵ European Commission, 2009. Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds.

⁶ Her Majesty's Stationery Office (HMSO), 1981. Wildlife & Countryside Act (1981), Chapter 69 As Amended.

⁷ HMSO, 1992. Protection of Badger Act 1992, Chapter 51. HMSO.

⁸ HMSO, 1994. The Conservation (Natural Habitats, &c.) Regulations 1994.

⁹ HMSO, 2004. Nature Conservation (Scotland) Act 2004.

¹⁰ HMSO, 2011. Wildlife and Natural Environment (Scotland) Act 2011.

¹¹ Joint Nature Conservation Committee (1992) The UK Biodiversity Action Plan (UK BAP) [online]. Available at: <http://jncc.defra.gov.uk/default.aspx?page=5155> .

¹² Scottish Executive, 2004. Scotland's Biodiversity: it's in Your Hands; A Strategy for the Conservation and Enhancement of biodiversity in Scotland [online]. Available at: <https://www.gov.scot/Resource/Doc/25954/0014583.pdf>

¹³ West Lothian Council, 2005. West Lothian Local Biodiversity Action Plan; Planning For Biodiversity Action 2005- 2009 [online]. Available at: <https://www.westlothian.gov.uk/media/2327/Planning-for-Biodiversity-Action-2005-2009/pdf/Planning-biodiversity-action2005-2009.pdf>

¹⁴ Design Manual for Roads and Bridges (DMRB) (2020). Available at : <http://www.standardsforhighways.co.uk/ha/standards/dmrb/vol11/index.htm>

Triturus cristatus) and requested that any required mitigation identified in the assessment should be presented in this chapter. SEPA requested that any likely disruptions to wetlands (including peatland) and disturbance and re-use of excavated peat should be identified in this chapter. These issues have been addressed within this chapter.

7.3 Assessment Methodology

7.3.1 This section presents full details of the methodology utilised for the assessment during field surveys which were undertaken for the proposed development, including references to best practice.

Criteria for Evaluating Importance of Features

7.3.2 Habitats and species (e.g. ecological features) identified within the desk and field study areas have been assigned ecological values using the standard CIEEM scale¹⁵ that classifies ecological features within a defined geographic context. The classification uses recognised and published criteria^{16,17} where the ecological features are assessed in relation to their size, diversity, naturalness, rarity, fragility, typicalness, connectivity with surroundings, intrinsic value, recorded history and potential value.

7.3.3 Table 7.1 describes the geographic frame of reference that has been used.

Importance	Examples
International	Internationally designated sites including Special Area of Conservation (SAC), Ramsar sites, Biogenetic Reserves, World Heritage sites, Biosphere Reserves, candidate SACs and potential Ramsar sites; discrete areas which meet the published selection criteria for international designation but which are not themselves designated as such; or a viable area of a habitat type listed in Annex I of the Habitats Directive ¹⁸ , or smaller areas which are essential to maintain the viability of a larger whole. Resident or regularly occurring populations of species which may be considered at an international level, such as European protected species (EPS), the loss of which would adversely affect the conservation status or distribution of the species at an international level; or where the population forms a critical part of a wider population; or the species is at a critical phase of its life-cycle.
National	Nationally designated sites including Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Marine Nature Reserves (MNR) and Special Protection Areas (SPA); discrete areas which meet the published selection criteria for national designation but which are not designated as such; or areas of a habitat type identified in the UK Post-2010 Biodiversity Framework ¹⁹ . Resident or regularly occurring populations of species which may be considered at the national level, such as species listed in Schedules 5 and 8 of the Wildlife and Countryside Act 1981 ²⁰ , the loss of which would adversely affect the conservation status or distribution of the species across Britain or Scotland; or where the population forms a critical part of a wider population; or the species is at a critical phase of its life-cycle.
Regional	Areas of a habitat type identified in the Regional Biodiversity Action Plan (BAP); viable areas of habitat identified as being of Regional value in the appropriate Natural Area Profile (or

¹⁵ Chartered Institute of Ecology and Environmental Management (CIEEM), 2016. Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal. Winchester: CIEEM.

¹⁶ Ratcliffe, D., 1977. A Nature Conservation Review. Cambridge: Cambridge University Press.

¹⁷ Wray, S., Wells, D., Long, E. and Mitchell-Jones, T., 2010. Valuing Bats in Ecological Impact Assessment. In Practice. December 2010, pp 23-25. Winchester: CIEEM.

¹⁸ European Commission, 1992. Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

¹⁹ UK Government, 2012. UK Post-2010 Biodiversity Framework [online]. Available at: <http://jncc.defra.gov.uk/page-6189> (Accessed on 19/06/18).

²⁰ Her Majesty's Stationery Office (HMSO), 1981. Wildlife and Countryside Act 1981 (as amended). HMSO.

Importance	Examples
	<p>equivalent); or smaller areas of such habitat which are essential to maintain the viability of a larger whole.</p> <p>Resident or regularly occurring populations of species which may be considered at an international level, or at the national level, the loss of which would adversely affect the conservation status or distribution of the species across the region; or where the population forms a critical part of a wider population; or the species is at a critical phase of its life-cycle.</p>
County	<p>Designated nature conservation sites at the local authority level in Scotland including statutory Local Nature Reserves (LNR) and non-statutory Local Nature Conservation Sites; or discrete areas which meet the published selection criteria for designation, but which are not designated as such.</p> <p>Resident or regularly occurring populations of species which may be considered at the local authority level, the loss of which would adversely affect the conservation status or distribution of the species across the local authority area.</p>
Local	<p>Features of local value include areas of habitat or populations/communities of species considered to appreciably enrich the habitat resource within the immediate surrounding area, for example, species-rich hedgerows.</p> <p>Resident or regularly occurring populations of species which may be considered at an international level, or at the national level, the loss of which would adversely affect the conservation status or distribution of the species across the immediate surrounding area; or where the population forms a critical part of a wider population; or the species is at a critical phase of its life-cycle.</p>

7.3.4 A wide range of sources can be used to assign importance to ecological features, including legislation and policy. In the case of designated nature conservation sites, their importance reflects the geographic context of the designation. For example, sites designated as SACs are recognised as being of importance at an international level. Ecological features not included in legislation and policy may also be assigned importance due to, for example, local rarity or decline, or provision of a functional role for other ecological features. Professional judgement is used to assign such importance.

Criteria for Characterising Impacts

7.3.5 The potential impacts upon ecological features have been considered in relation to the Proposed Development. The impacts have been assessed without consideration of any specific mitigation measures that might be employed. The assessment of likely ecological impacts has been made in relation to the baseline conditions of the study area. The likely impacts of development activities upon ecological features have been characterised according to several variables detailed in Table 7.2.

Parameter	Description
Direction	Impacts are either adverse (negative) or beneficial (positive).
Magnitude	<p>This is defined as high, moderate, low or negligible, with these being classified using the following criteria:</p> <ul style="list-style-type: none"> • High: Total/near total loss of a population due to mortality or displacement or major reduction in the status or productivity of a population due to mortality or displacement or disturbance. Total/near total loss of a habitat. • Medium: Partial reduction in the status or productivity of a population due to mortality or displacement or disturbance. Partial loss of a habitat. • Low: Small but discernible reduction in the status or productivity of a population due to mortality or displacement or disturbance. Small proportion of habitat lost. • Negligible: Very slight reduction in the status or productivity of a population due to mortality or displacement or disturbance. Reduction barely discernible, approximating to

Parameter	Description
	the 'no change' situation. Slight loss of habitat that is barely discernible from the habitat resource as a whole.
Extent	The area over which an impact occurs.
Duration	The time for which the impact is expected to last prior to recovery of the ecological feature or replacement of the feature by similar resource (in terms of quality and/or quantity). This is expressed as a short-term, medium-term, or long-term effect relative to the ecological feature that is impacted.
Reversibility	Irreversible impacts: permanent changes from which recovery is not possible within a reasonable time scale or for which there is no reasonable chance of action being taken to reverse it. Reversible impact: temporary changes in which spontaneous recovery is possible or for which effective mitigation (avoidance/cancellation/reduction of effect) or compensation (offset/recompense/offer benefit) is possible.
Frequency and Timing	The number of times an activity occurs will influence the resulting effect (if appropriate, described as low to high and quantified, where possible). The timing of an activity or change may result in an impact if it coincides with critical life-stages or seasons e.g. the badger breeding season.

7.3.6 The assessment only describes those characteristics relevant to understanding the ecological impact and determining the significance of the effect.

Criteria for Assessing Cumulative Impacts

7.3.7 Cumulative impacts can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location. Cumulative impacts are particularly important in Ecological Impact Assessments (EcIA) as many ecological features are already exposed to background levels of threat or pressure and may be close to critical thresholds where further impacts could cause irreversible decline and significant effects. Further impacts can also make habitats and species more vulnerable or sensitive to change.

7.3.8 Developments included in the cumulative impact assessment are the following types of future development within the same zone of influence:

- Committed developments within 5 km of the proposed development; and
- Wind farm proposals in the earlier stages of the planning process.

Significance Criteria

7.3.9 Significant effects are assessed with reference to the geographical importance of the ecological feature. However, the scale of significance of an effect may not be the same as the geographic context in which the feature is considered important. For example, a significant effect on a species protected by national legislation does not necessarily equate to a significant effect on its national population.

7.3.10 For the purposes of EcIA, apart from in exceptional circumstances, a significant effect, as defined by the EIA Regulations, is only considered to be possible where the feature in question is considered to be of regional, national or international importance. That is not to say that impacts from the proposed development could not result in significant effects on features of county or local importance, simply that those effects are not considered significant under EIA Regulations.

7.3.11 Mitigation and/or compensation is proposed for all effects considered significant under the EIA Regulations. Where appropriate, as part of additional good practice, mitigation and/or compensation may be proposed for significant effects on features of county or local

importance, or where required in relation to protected species where legislation may require actions to protect populations or individuals.

Limitations and Assumptions

- 7.3.12 It should be noted that the availability and quality of the data obtained during desk studies is reliant on third party responses and recorders. This varies from region to region and for different species groups. Furthermore, the comprehensiveness of data often depends on the level of coverage, the expertise and experience of the recorder and the submission of records to the local recorder.
- 7.3.13 The habitat and faunal surveys provide a snapshot of ecological conditions and do not record plants or animals that may be present in the field study area at different times of the year. The absence of a particular species cannot definitely be confirmed by a lack of field signs and only concludes that an indication of its presence was not located during the survey effort. However, all surveys were undertaken during optimal periods for identifying flowering plants or locating faunal species' field signs and there are not considered to be any limitations on the data derived.

Field Survey Methodology

Extended Phase 1 Habitat Survey

- 7.3.14 The Extended Phase 1 Habitat survey was undertaken on 16 June 2018 by suitability qualified ecologists Elizabeth Butler and Nadine Little MCIEEM. An additional survey was undertaken in July 2019 by Elizabeth Butler and Sarah Carruthers GradCIEEM focusing on protected species to update the original survey records.
- 7.3.15 It involved a site walkover with an assessment of key habitats, land use and ecological features focusing on areas of natural interest that could be affected by the proposed development. Habitats of potential sensitivity were recorded along with any other features of potential ecological value such as high-quality habitat suitable for protected species. These habitats were mapped using standard Phase 1 habitat survey methodology²¹. Target notes were used in conjunction to record smaller habitats of particular interest and notable species.
- 7.3.16 Examples of notable species include, but are not limited to, national or local BAP species, restricted range species, species or species groups listed against local designated nature conservation sites in the area or key species groups, such as invertebrates or non-vascular plants. It should be noted that such species are not considered to have the same importance as those protected by legislation; however, their inclusion allows a more holistic approach and therefore a more robust assessment.
- 7.3.17 The field study area was surveyed for signs of any invasive plant species subject to legal controls, such as giant hogweed *Heracleum mantegazzianum*, Japanese knotweed *Fallopia japonica*, Himalayan balsam *Impatiens glandulifera* or other species listed in Schedule 9 of the Wildlife and Countryside Act 1981 (as amended)²². The site was also assessed for its potential to support species protected by international and national legislation, such as badger, otter, water vole and GCN.

Protected Species

- 7.3.18 Protected species surveys were undertaken within the field study area during the Extended

²¹ Joint Nature Conservation Committee (JNCC), 2010. Handbook for Phase 1 Habitat Survey: A Technique for Environmental Audit.

²² Her Majesty's Stationery Office (HMSO), 1981. Wildlife and Countryside Act 1981 (as amended).

Phase 1 habitat surveys as described above. The desk study identified habitat suitable for the following species, the field signs sought for each protected species are listed below. Note that the survey also included assessment for nesting bird (i.e habitat suitable to support nesting birds) and reptiles.

BADGER

7.3.19 The survey looked for the following badger field signs as per good practice guidelines²³:

- Setts;
- Latrines;
- Paths; and
- Foraging signs.

7.3.20 Any setts found were classified as either main, subsidiary or outlier and their level of usage indicated.

OTTER

7.3.21 The otter survey involved a detailed search of all watercourses within the field study area according to best practice guidelines²⁴. The field signs sought were:

- Holts;
- Couches;
- Spraints;
- Feeding remains;
- Footprints;
- Slides; and
- Sightings.

WATER VOLE

7.3.22 The water vole survey comprised a search of riparian and pond edge habitat for characteristic signs of activity. The survey assessed all watercourses and water bodies within the field study area and for a distance of 200 m up and downstream in accordance with good practice guidelines²⁵. The signs sought were:

- Burrows;
- Latrines;
- Feeding stations;
- Runs; and
- Sightings.

BATS

7.3.23 A daytime bat inspection of mature trees within the study area was completed as part of the Extended Phase 1 Habitat survey, in accordance with good practice guidelines²⁶. Each tree

²³ Scottish Natural Heritage (2003) Best Practice Guidance - Badger Surveys. Inverness Badger Survey 2003. Commissioned Report No. 096.

²⁴ Chanin, P., 2003. Monitoring the otter *Lutra lutra*, Conserving Natura 2000 Rivers Monitoring Series No 10, Peterborough: English Nature.

²⁵ Strachan, R., 2012. Water Vole Conservation Handbook, Third Edition, Wildlife Conservation Research Unit.

²⁶ Collins, J. (ed.), 2016. Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition). London: The Bat Conservation Trust.

was assessed from the ground for its potential to support roosting bats and categorised dependent on the presence of features suitable to support bat roosts. The categories assigned were: High, Medium, Low and Negligible Potential for use by bats.

7.3.24 Table 7.3 provides criteria for each of these categories as per good practise guidelines²⁶.

Table 7.3: Bat Roost Potential	
Parameter	Description
High	A tree with one or more potential roost site(s) that is obviously suitable for use by larger numbers of bats on a regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.
Moderate	A tree with one or more potential roost site(s) that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status.
Low	A tree with one or more potential roost site(s) that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection and/or suitable surrounding habitat to be used on a regular basis or by a large number of bats (e.g. unlikely to be suitable for hibernation or maternity). Trees of sufficient size and age to contain potential roost features but with none seen from the ground or features seen with very limited roosting potential.
Negligible	Negligible habitat features on site likely to be used by roosting bats.

GREAT CRESTED NEWT

7.3.25 Four ponds were identified within the study area (as shown on Figure 7.4 in Volume 4) in June 2018, each were assessed to determine suitability for GCN using Habitat Suitability Index (HSI) methodology²⁷. The HSI is a numerical index, between 0 and 1, with 0 indicating unsuitable habitat and 1 representing optimal habitat for GCN. The HSI incorporates ten suitability indices, all of which are factors thought to affect GCN suitability. The outcome of this assessment then determines the need for further survey, i.e. environmental DNA (eDNA) analysis to confirm presence or likely absence.

Baseline Characterisation

7.3.26 Ramboll used the following methods to characterise the existing baseline conditions at the site and in the surrounding area.

Study Area / Field Study Area

7.3.27 The 'study area', within which the field surveys were conducted, includes the site (as shown on Figures 7.1-7.4 in Volume 4) and a buffer of up to 500 m. This buffer was considered to account for the occurrence of protected species, the distance of which is largely based on the maximum dispersal distance for GCN (taking into account barriers to dispersal in the landscape such as roads).

Desk Study

7.3.28 The desk study considers a buffer of 10 km from the Proposed Development as shown on Figure 7.1 in Volume 4. The purpose of the desk study was to collect existing baseline data about the site and the surrounding area, such as the location of designated nature conservation sites or other natural features of potential ecological importance. The desk study area was surveyed using the following data sources:

²⁷ Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000). Evaluating the suitability of habitat for the Great Crested Newt (*Triturus cristatus*). *Herpetological Journal* 10 (4), 143-155

- MAGIC mapping website²⁸;
- The Wildlife Information Centre (TWIC)²⁹;
- West Lothian Local Biodiversity Action Plan (BAP)³⁰;
- Winchburgh Masterplan Environmental Statement (ES)³¹;
- Proposed M9 Junction, Winchburgh EIA Scoping Report³²; and
- Supplementary information obtained from aerial images available from Google™ Earth Pro.

7.3.29

Winchburgh Masterplan Environmental Statement

7.3.30 Ramboll, formerly ENVIRON, prepared an Environmental Statement (ES)³³ in 2005 to support the planning application for the Winchburgh Masterplan development. Results of ecology surveys detailed within that ES, along with subsequent ecological surveys completed post-application, have been considered as part of the desk study and have been taken into account in this assessment where appropriate.

Proposed M9 Junction EIA scoping report

7.3.31 Ramboll, prepared an EIA Scoping Report³⁴ in 2014 for a previous iteration of the proposed motorway junction at Winchburgh. A formal Scoping Opinion was not received from Transport Scotland; however, results of the ecology surveys completed in support of that Scoping Report have been considered as part of the desk study and taken into account in this assessment where appropriate.

7.4 Baseline Conditions

Current Baseline

Statutory Designated Nature Conservation Sites

7.4.1 The site does not include any statutory sites designated at an international, national or local level for habitat or non-avian species conservation. Designated sites of ecological importance located within 10 km of the proposed development are listed in Table 7.4 and shown on Figure 7.1 in Volume 4. Note that the connectivity with designated sites and the proposed development site by features such as watercourses has been considered.

²⁸ Natural England, 2018. MAGIC Mapping [online]. Available at: <http://www.natureonthemap.naturalengland.org.uk/> (Accessed on 19/06/18).

²⁹ The Wildlife Information Centre, 2018. Home page [online]. Available at: <http://www.wildlifeinformation.co.uk/index.php> (Accessed on 19/06/18).

³⁰ West Lothian Council, 2005. West Lothian Local Biodiversity Action Plan – Planning for Biodiversity Action 2005-2009 [online]. Available at: <https://www.westlothian.gov.uk/media/2327/Planning-for-Biodiversity-Action-2005-2009/pdf/Planning-biodiversity-action2005-2009.pdf> (Accessed on 19/06/18).

³¹ ENVIRON, 2005. Winchburgh Masterplan Environmental Statement (ES).

³² ENVIRON, 2014. Proposed M9 Junction, Winchburgh: EIA Scoping Report.

³³ ENVIRON, 2005. Winchburgh Masterplan Environmental Statement.

³⁴ ENVIRON, 2014. Proposed M9 Junction, Winchburgh: EIA Scoping Report.

Table 7.4: Designated Sites

Site Name	Qualifying Feature(s)	Distance from Proposed Development at Closest Point (km)	Connectivity with Proposed Development
Philipstoun Muir SSSI	Ancient Woodland habitat	1.6 km west	Separated from the proposed development by farmland habitat and railway line to the west. Direct or indirect impacts are considered unlikely.
Firth of Forth SSSI, SPA & RAMSAR site	Coastal habitats Invertebrate rich mudflats Important wintering site for national and internationally important bird species Important site for migratory birds	Covers various sections of the coastline to the north. 2.7 km north west of the proposed development at closest point.	Separated from the proposed development by farmland and woodland and major roads (A904). Direct or indirect impacts are considered unlikely.
St Margaret's Marsh SSSI	Reed bed and saltmarsh habitat	5.5 km north	Separated from the proposed development by Firth of Forth. Direct or indirect impacts are considered unlikely.
Ferry Hills SSSI	Notable terrestrial habitat	5.7 km north	Separated from the proposed development by Firth of Forth. Direct and indirect impacts are considered unlikely.
Linlithgow Loch SSSI	Eutrophic aquatic and emergent plant communities	7.6 km west	Separated from the proposed development by notable distance and settlements (Linlithgow) to the west. Direct or indirect impacts are considered unlikely.
Calderwood SSSI	Upland oak woodland habitat Valley fen habitat	8.4 km south	Separated from the proposed development by settlements and major roads (M8) to the south. Direct or indirect impacts are considered unlikely.
Forth Islands SPA	Notable breeding birds Notable seabird assemblage of international importance	~5 km north east	Site includes small islands within the Firth of Forth. Direct or indirect impacts are considered unlikely.

Non- Statutory Designated Nature Conservation Sites

7.4.2 Stands of woodland listed on the Ancient Woodland Inventory³⁵ are present within the study area. Approximately 500 m² of woodland identified as Ancient Woodland occurs within the site boundary at the southern end of the site boundary to south of the M9, as shown on Figures 7.2a-b in Volume 4.

Local Biodiversity Action Plan

7.4.3 The West Lothian Local Biodiversity Action Plan (LBAP) is of relevance to the proposed development. The action plan, when published, covered years 2005-2009 and has not since been updated. The priority species that are included in the BAP and have been recorded within the study area include: badger, otter and water vole. The following habitats located within the site have been identified as strategic habitats in the West Lothian LBAP: streams, farmland

³⁵ SNH, 2018. History of Scotland's Woodland [online]. Available at: <http://www.snh.gov.uk/docs/C283974.pdf> (Accessed on 05/09/18).

and woodland.

The Wildlife Information Centre (TWIC)

7.4.4 As part of the desk study, local biological records were sought from TWIC on the 16th of August 2018. Notable species records within 5 km of the proposed development received from TWIC are summarised in Table 7.5.

Species	UK Status	LBAP species	UK BAP species	TWIC Records
Mammals				
Badger	Species of Conservation Concern. Protected under the Badger Protection Act 1992	Y	N	558 records of badger sightings/ setts or activity recorded within 5km of the proposed development between 1966 and 2017
Otter	Priority species within the UKBAP, protected as Schedule 5 species - under the Wildlife and Countryside Act 1981	Y	Y	Six records of otter sightings/ holts or activity recorded within 5km of the proposed development between 1991 and 2015. The closest observation to the proposed development was otter spraint on the Niddry Burn, situated 1.8 km to the south and recorded in 2012.
Water Vole	Species of Conservation Concern & priority species within the UK BAP. Schedule 5 species protected under the Wildlife and Countryside Act 1981	Y	Y	Two records of water vole occur within 5 km. Records date between 1994 and 2000. These operations were recorded near Faucheldean and upon the Union Canal, to the south of the proposed development.
Bat species	All species listed as priority species within the UKBAP. Protected under Schedule 5 of the Wildlife and Countryside Act 1981. All species listed are Species of Conservation Concern (apart from pipistrelle)	Y	Y	115 local records of soprano pipistrelle <i>Pipistrellus pygmaeus</i> and common pipistrelle <i>Pipistrellus pipistrellus</i> bats within 5k m of the proposed development. Records occur 1989 to 2017. 100 records of Daubenton's bat <i>Myotis daubentonii</i> , within 5 km, namely around habitat associated with the Union Canal. Records between 1997 and 2016. Five records of brown long-eared bats <i>Plecotus auritus</i> within 5 km of the proposed development between 1988 and 2016 Two records of noctule bats <i>Nyctalus noctula</i> within 5 km between 2011-2015. One record of Natterer's bat <i>Myotis nattereri</i> in taken in 1988 within the grounds of Duntarvie Castle, immediately to the north of the proposed development.
Birds				
Peregrine falcon <i>Falco peregrinus</i>	Protected under Schedule 1 of the Wildlife and Countryside Act 1981, species of conservation concern within the UKBAP.	Y	N	11 records taken within 5 km of the proposed development between 1999 and 2017. There are no records of breeding.
Kingfisher <i>Alcedo atthis</i>	Protected under Schedule 1 of the Wildlife and	Y	N	Six records of kingfisher within 5 km of the proposed development recorded

Table 7.5: TWIC Records of Notable Species within the Desk Study Area				
Species	UK Status	LBAP species	UK BAP species	TWIC Records
	Countryside Act 1981, species of conservation concern within the UKBAP.			between 1994 and 2016. The closest observation to the proposed development was recorded 0.8 km to the south at Winchburgh Quarry in 2003. There are no records of breeding.
Barn owl <i>Tyto alba</i>	Protected under Schedule 1 of the Wildlife and Countryside Act 1981, species of conservation concern within the UKBAP.	Y	N	15 records of barn owl within 5 km. Observations recorded between 1992 and 2017. There are no records of breeding
Merlin <i>Falco columbarius</i>	Protected under Schedule 1 of the Wildlife and Countryside Act 1981, species of conservation concern within the UKBAP.	N	N	One record of merlin within 5 km south of the proposed development in 2008.
Amphibians				
Great crested newt	Priority species within the UKBAP, protected as Schedule 5 species - under the Wildlife and Countryside Act 1981	Y	Y	42 records of GCN between 1996 and 2012, all within 5 km of the proposed development.
Insects				
Sword-grass moth <i>Xylena exsoleta</i>	Priority species listed within the UK BAP	Y	N	5 records of this species within 5 km of the site. One record within Hopeton Estate, 2 km north. Four records near Totlewells within 1 km north east of the proposed development.

Phase 1 Habitat Survey

7.4.5 Ramboll undertook an Extended Phase 1 Habitat survey of the site in October 2014³⁶ that recorded the following:

- Trees with potential to support roosting bats;
- Vegetation and landforms with potential to provide badger sett locations (no setts identified);
- Watercourses with potential for water vole;
- Watercourses with potential for otter;
- Ponds with potential to support amphibian species; and
- Potential groundwater dependent terrestrial ecosystems (GWDTE).

7.4.6 The 2014 survey was updated by an Extended Phase 1 Habitat survey undertaken during June 2018, within the optimal survey period. Surveys were undertaken by Ramboll ecologists Nadine Little MCIEEM and Elizabeth Butler MSc who have 8 and 4 years of professional ecological survey experience, respectively. Survey efforts considered the features listed above in addition to:

- Surveys for signs of any protected mammal species, e.g. badger, water vole and otter;

³⁶ Proposed M9 Junction, Winchburgh. EIA Scoping report 2014.

- HSI evaluation of any bodies of standing water to determine their potential to support GCN; and
- Inspection of trees to identify suitability for use by roosting bats.

7.4.7 An additional survey visit was carried out on the 3rd July 2019 by ecologists Elizabeth Butler MSc and Sarah Carruthers GradCIEEM to update and/or confirm all records of protected species observed during the June 2018 surveys. Protected species such as badger, otter and water vole are mobile species likely to move or expand setts or dens, therefore it was appropriate to conduct a second visit.

7.4.8 All habitat types and protected species signs that were recorded within the study area, are detailed in Technical Appendix 7.1 in Volume 3 and shown on Figures 7.3 and 7.4 in Volume 4.

7.4.9 The dominant habitats present in the study area are arable land and improved grassland. Running immediately parallel to the M9 motorway, along its embankments, there are areas of plantation broadleaved woodland and semi-improved neutral grassland. An area of semi-natural broadleaved woodland occurs in the northern part of the site and another section of the broadleaved woodland habitat located in the south eastern part of the site is noted as Ancient Woodland (refer to Figure 7.2a,b in Volume 4). The area of listed Ancient Woodland (500 m²) at the south east section of the site and the broadleaved woodland habitat across the whole site would be considered as potentially sensitive habitat.

Protected Species

7.4.10 Signs of protected species recorded during both ecology survey visits (June 2018 and 2019) are shown on Figure 7.4 in Volume 4 and Confidential Technical Appendix 7.2 in Volume 3. Findings are detailed in Technical Appendix 7.1 and Confidential Technical Appendix 7.2. A summary of the protected species recorded are as follows:

- Various signs of badger activity (as detailed in Technical Appendix 7.2: Confidential Ecology Results);
- Trees with low bat roost potential (BRP); and
- Woodland habitat suitable for breeding birds.

7.4.11 No pond was identified as potentially suitable habitat for GCN. As a result, GCN will not be considered further within this assessment.

Breeding Birds

7.4.12 Habitats on the site, particularly the woodlands, are considered to be suitable for common breeding birds which inhabit the woodland and farmland edge habitats of the area.

Future Baseline

7.4.13 The future baseline would be defined by similar land use as present, in this instance farming. This is likely to continue for the foreseeable future.

Summary of Importance of Ecological Features

7.4.14 A summary of the ecological features identified as being sensitive to the proposed development and that have been 'scoped in' to the assessment is given in Table 7.6, together with the justification for their inclusion.

Note that although no otter or water vole were recorded on site during field surveys these species have still be 'scoped in' to this assessment given the abundance of suitable habitat within the vicinity of the site (i.e watercourses) and also records from TWIC of these species

in the wider area.

Table 7.6: Sensitivity of Heritage Assets		
Feature	Importance	Justification
Ancient Woodland	Local	Although no specific legislation protects Ancient Woodland, there is a strong presumption against removing ancient semi-natural woodland or plantations on ancient woodland sites ³⁷ . Although Ancient Woodland is common throughout the UK and in the local area (Figure 7.2 in Volume 4), this assessment considers it to be of local importance for the sake of nature and biodiversity conservation, given the urbanised nature of the local area (e.g. developments and infrastructure).
Woodlands (semi-natural broadleaved and mixed woodland)	Local	Woodland provides habitat for a broad range of species, such as birds and bats. This habitat type occurs along the existing embankments of the M9 motorway, within the site. Although woodland is common within the study area and in the local area, this assessment considers it to be of local importance for the sake of nature and biodiversity conservation, given the urbanised nature of the local area (e.g. developments and infrastructure).
Badger	Local	Badgers are protected under the Protection of Badgers Act 1992 and are listed within the West Lothian BAP. Local records of badger within the desk study were attained from TWIC, as detailed in Table 7.5. Badgers are known to utilise the surrounding areas. Multiple records were made of setts and badger activity during the 2005 surveys in support of the Winchburgh ES. Badger activity was recorded within the site boundary during 2018 and 2019 ecology surveys, as discussed in Technical Appendix 7.2 in Volume 4. Badgers are common in the surrounding area. However, as badgers and their dwellings are protected by law, any disturbance or damage could result in a legal offence being committed. Badgers are considered to be of local importance.
Bat species	Local	Bats are afforded protection as European Protected Species (EPS) under the EC Habitats Directive. Local records of bat species within the desk study were attained from TWIC, as detailed in Table 7.5. Trees within the site were considered to have low suitability to support roosting bats. The habitat is also considered to be suitable for foraging and commuting bats; therefore the site is considered to be of local importance for bat species.
Otter	Local	Otter are listed as a EPS under the EC Habitats Directive. Local records of otter within the desk study were attained from TWIC, as detailed in Table 7.5. No otter activity was recorded within the site during the 2018 or 2019 ecology surveys for the proposed development. However, surveys conducted in 2004-2005 as part of the Winchburgh Masterplan ES recorded multiple signs of activity (spraints) along watercourses such as the Union Canal to the south and the Swine Burn on the south side of the M9 motorway. Given the overall low level of activity recorded, the population of otter using the habitat within the site application boundary is considered to be of local importance.
Water vole	Local	Water vole are protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). The species is also included within the UK BAP and the West Lothian BAP. Local records of water vole within the desk study were attained from TWIC, as detailed in Table 7.5. Suitable riparian habitat for water vole is present within the site, and the immediate surroundings. A latrine was recorded on the Swine Burn within the site, during the 2005 surveys for the Winchburgh Masterplan ES. Water vole

³⁷ Scottish Natural Heritage, 2018. History of Scotland's Woodland [online]. Available at: <http://www.snh.gov.uk/docs/C283974.pdf> (Accessed on 05/09/18).

Table 7.6: Sensitivity of Heritage Assets

Feature	Importance	Justification
		are also known to be present on the Union Canal which is situated to the south of the Proposed Development. No field signs were recorded during the 2018 or 2019 ecology surveys. Given the low level of activity recorded, the population of water vole is considered to be of local importance.
Breeding birds	Local	Habitats are considered to be suitable to support breeding bird species common to the local area and, as such, breeding birds are considered to be of local importance.

7.5 Assessment of Likely Effects

Construction Effects

7.5.1 The assessment of likely effects associated with construction is based on the activities described in Chapter 2: Proposed Development Description.

Statutory Designated Nature Conservation Sites

7.5.2 The proposed development is situated far enough away from any statutory designated sites, separated in each direction by existing infrastructure and urban settlements. No potential impact pathways for pollution, sediments, dust or noise to reach those sites. Therefore, no impacts upon designated nature conservation sites have been identified. The impact on statutory designated sites are not considered further in this assessment.

Non-statutory Designated Nature Conservation Sites

7.5.3 The impacts on Ancient Woodland are considered in the Habitats section as follows.

Habitats

7.5.4 Construction activities have the potential to: degrade or destroy terrestrial habitat either directly through excavation, compaction, or modification (e.g. vegetation removal); or indirectly as a result of dewatering or from the accidental release of fuels and/or other chemicals. The construction of a widened embankment either side of the M9 to facilitate the installation of slip roads would cause temporary, short-term habitat loss, that would be restored via landscaping and planting after construction. Similarly, habitat loss arising from construction traffic, temporary site facilities and temporary access tracks would cause a temporary habitat loss in the short-term until habitats are reinstated following construction of the proposed development (refer to Chapter 2: Proposed Development Description). Habitat loss calculations are reported within Technical Appendix 7.1 in Volume 3.

7.5.5 Semi-natural broadleaved woodland, which includes listed Ancient Woodland, was identified as a potentially sensitive habitat occurring within the site. If removal of this woodland is required, direct loss of semi-natural broadleaved woodland as part of embankment widening during construction would result in a temporary, medium-term loss of woodland habitat. It is noted that this could form a permanent loss of woodland if replacement planting is not adequate or equivalent. However, it is anticipated that felling is not required within the area of Ancient Woodland in the south east section of the site; in that event, loss of non-statutory designated habitat would be avoided. Indirect disturbance of this habitat is possible due to the use of access tracks parallel to the Ancient Woodland stand during construction. Disturbance to this habitat during construction is considered to be temporary and would likely not result in significant effects.

Badger

- 7.5.6 Given the legal protection afforded to this species under the Protection of Badgers Act (1992), survey details for this species at the proposed development site are confidential and are presented within Confidential Technical Appendix 7.2: Confidential Ecology Results.
- 7.5.7 Badgers occur within the site boundary and are likely to be disturbed and/or their setts destroyed as a result of construction works (e.g. vegetation clearance, embankment works and construction of access track). This would be a significant adverse effect at the local level which is considered to be significant in EIA terms as any disturbance (generally considered to be construction activity within 30 m) or destruction of a sett would need to occur under an SNH licence to comply with the Protection of Badgers Act 1992.
- 7.5.8 The construction of new slip roads for the proposed development would introduce construction traffic movements into areas utilised by badgers (foraging and commuting) when there was open countryside. Badgers remain extremely faithful to historical pathways and are likely to continue to use these pathways, even if that requires crossing new roads. This could result in badger fatalities from construction traffic collisions due to the moderate level of badger activity within the site. However, as badgers are nocturnal species, fatalities are unlikely unless night-time working occurs, but even then, a significant effect is considered to be unlikely as the noise of construction and human presence would disturb badgers from the area.

Bats

- 7.5.9 Three mature trees were identified within the site boundary as having potential to support roosting bats. Two mature trees, a horse chestnut *Aesculus hippocastanum* and sycamore *Acer pseudoplatanus* situated along the existing B8020, were assessed as having low roost potential. Another mature sycamore situated at the base of the M9 embankment (on the edge of the site boundary to the north) was also assessed as having low bat roost potential. Locations of these trees are detailed in Technical Appendix 7.1: Ecology Survey Results and shown on Figure 7.1.4: Target Notes. If these trees were felled during construction there is the potential, albeit low, for destruction of a bat roost and/or injury or death of any bats roosting within the trees. Although this is considered to be an adverse effect at the local level, the loss of a roost is considered to be significant in EIA terms as any felling would need to comply with the EC Habitats Directive which protects bats and their roosts.
- 7.5.10 Artificial lighting in temporary construction compounds could result in light spill onto adjacent habitats, which is likely to disturb commuting and foraging bats utilising that habitat. This is likely to be a localised, low magnitude impact on this species group and the effect is considered to be not significant.

Otter

- 7.5.11 Construction of the proposed development could lead to the temporary, localised, low magnitude, short-term disturbance of otter within the Swine Burn culvert. The effect is considered to be not significant due to the extremely low level of otter activity recorded in the study area.
- 7.5.12 A new culvert will be installed approximately 20 m upstream of the existing culvert on the Swine Burn to accommodate an access track on the south side of the M9. Any diversion of the Swine Burn during installation of this culvert is likely to restrict the movement of commuting and foraging otter within the watercourse. However, as these species were not recorded during 2018 and 2019 ecology surveys there are no impacts predicted. Although, the site includes suitable habitat for this species and there are records in the wider area, there

is considered the potential for the species to occur. In the event that they were present this would lead to a short-term, temporary and localised low magnitude impact during construction.

Water vole

- 7.5.13 A new culvert will be installed approximately 20 m upstream of the existing culvert on the Swine Burn to accommodate an access track on the south side of the M9. As for otter, any diversion of the Swine Burn during installation of this culvert is likely to restrict the movement of commuting and foraging water vole within the watercourse. However, as these species were not recorded during 2018 and 2019 ecology surveys there are no impacts predicted. Although, the site includes suitable habitat for this species and there are records in the wider area, there is considered the potential for the species to occur. In the event that they were present this would lead to a short-term, temporary and localised low magnitude impact during construction.

Breeding birds

- 7.5.14 Clearance of vegetation, such as woodland along the existing embankments, if carried out during the breeding bird season (March-August) could result in the disturbance or destruction of nests leading to failed breeding for some species and result in an offence under the Wildlife and Countryside Act 1981 (as amended). This would be an adverse effect at the local level but is not considered to be significant in EIA terms.

Operational Effects

Habitats

- 7.5.15 Operational effect on Philpstoun Muir SSSI woodland habitat, in terms of increased air pollution from traffic in the area as a result of the proposed development, has been discussed in Chapter 8: Air Quality. No impact on this woodland as a potentially sensitive ecological receptor was determined given distance from site (~1 km).

Badger

- 7.5.16 The operational slip roads for the proposed development would introduce frequent traffic movements into areas previously crossed by badgers when there was open countryside. Badgers remain extremely faithful to historical pathways and are likely to continue to use these pathways, even if that requires crossing new roads. This could result in badger fatalities from road traffic collisions due to the moderate level of badger activity within the site. This is considered to be a significant adverse effect on badgers at the local level.

Bats

- 7.5.17 Artificial lighting along sections of new road and roundabouts could result in light spill onto adjacent habitats, which is likely to disturb commuting and foraging bats utilising these habitats. This would be a localised, low magnitude impact on this species group and the effect is considered to be not significant.

7.6 Assessment of Cumulative Effects

- 7.6.1 There are not considered to be any developments likely to contribute a cumulative effect on ecological receptors alongside the proposed development. Therefore, no assessment of cumulative effects is included here.

7.7 Mitigation

Mitigation during Construction

Badger

- 7.7.1 Badger proof fencing would be installed before works begin to ensure badgers are excluded, preventing them from establishing setts. Full details of planned mitigation are provided in Technical Appendix 7.3: Confidential Mitigation.
- 7.7.2 A pre-construction badger survey would be undertaken prior to work commencing. The survey would identify badger activity particularly the presence of any new setts that may be affected by construction. Pre-construction surveys would need to be carried out by appropriately qualified ecologists no less than **one month prior** to the start of construction activities.
- 7.7.3 Any setts identified within the site would be protected by a 30 m buffer during construction (e.g. vegetation clearance and construction of access track) to avoid disturbance to any badgers using setts. These buffer areas would be marked out by ecologists during pre-construction surveys.
- 7.7.4 All works within 30 m of an active sett entrance must occur under a SNH licence³⁸ and the supervision of a licenced ecologist. Any digging or excavation within this buffer area must be conducted under supervision and by using hand tools only. Any works occurring within 30 m of a maternity sett are subject to stricter controls, works could only occur outwith the main breeding season (1st December- 30th June inclusive) and would need to be supervised by licenced ecologist (SNH disturbance licence for maternity setts). Note that badgers can breed at anytime of year however the 1st December -30th June (inclusive) is considered the main breeding season.
- 7.7.5 Where works within 30m of a sett, which would potentially damage the sett, are unavoidable the sett would be excluded under SNH licence with supervision of a licenced ecologist as described above.
- 7.7.6 A Badger Protection Plan (BPP) would be produced as part of the Environmental Management Plan (EMP) to ensure best practice is followed prior to and throughout construction.

Bats

- 7.7.7 Removal of any of the bat roost potential trees (e.g. felling to enable construction of the proposed development) would only be permitted following a thorough inspection of the trees for potential roost by a licensed ecologist, as per best practice guidance^{39 40}. The licensed ecologist would conduct a detailed assessment of the trees, checking all potential roost features (e.g cracks and holes) for roosting bats. Once the presence / absence of a bat roost is determined a decision will be made regarding the appropriate mitigation. If a roost is discovered, then removal/relocation of the roost must occur under SNH licence. If no roosts or roosting individuals are found, then felling can be permitted. It is recommended that trees are felled using soft felling methods, even if bats are not found during the assessment, as to minimise any risk of injuring or killing bats which may be present and undetected.
- 7.7.8 Artificial lighting in temporary construction compounds could result in light spill onto adjacent habitats, which is likely to disturb commuting and foraging bats utilising that habitat. A bat-

³⁸ SNH (2018) Badgers and Licencing. Available at: <https://www.nature.scot/professional-advice/safeguarding-protected-areas-and-species/licensing/species-licensing-z-guide/badgers-and-licensing>

³⁹ Collins, J. (ed.).(2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition). London: The Bat Conservation Trust.

⁴⁰ Andrews, H. (2018). Bat Roosts in Trees: A Guide to Identification and Assessment for Tree-Care and Ecological Professionals. Pelagic Publishing, 1st ed.

friendly lighting design should be adapted during construction, if lighting is required on site during periods of bat activity (i.e. hours of darkness, dusk and dawn). As per best practice guidance⁴¹ light spill should avoid habitat likely being used by foraging / commuting bats such as area of woodland and hedge lines. Appropriate luminaire specifications should be utilised ideally warm white spectrum (<27000Kelvin) LEDs.

Breeding birds

- 7.7.9 Vegetation clearance and removal activities would need to occur outside the breeding bird season (March-August, inclusive). If this is not possible, a nesting bird survey would need to be undertaken by a suitably qualified ecologist prior to vegetation clearance. The time gap between nesting bird check and vegetation removal cannot exceed 48 hours. If nests are found then a suitable buffers (typically 10 m) will need to be applied around any nests recorded within the site. Works would not be permitted in the protective buffer zone until the chicks have fledged and the nest is confirmed to be inactive by a suitably qualified ecologist.

Mitigation during Operation

Badger

- 7.7.10 The installation of badger-proof fencing prior to construction along the base of the embankment which borders the eastbound merge slip road would prevent badgers from accessing high speed traffic areas once the junction is in use. The proposed route and extent of this fencing is detailed in Technical Appendix 7.3, Figure 7.3.1. This fence would be constructed between the road and areas of badger activity preventing badger from accessing the new motorway junction features. An access gate would need to be provided within the fencing allowing for access to the maintenance track and field. This gate must remain closed at all times when not in use to prevent badgers from crossing the B8020 at this point and being exposed to the increased traffic flow. An example badger-proof fencing specification to be followed is provided by SNH in best practice guidance for developments⁴².

7.8 Additional Good Practice Measures

Habitats

- 7.8.1 Habitat loss as a result of construction would be short-term and restored via planting and landscaping along embankment areas, with reference to the Scottish Government's Policy on the Control of Woodland Removal⁴³. Planting designs should incorporate native scrub and tree species. The following species are considered to be suitable:
- hawthorn *Crataegus monogyna*;
 - rowan *Sorbus aucuparia*;
 - silver birch *Betula pendula*; and
 - sessile oak *Quercus robur*.
- 7.8.2 Planting regimes should aim to create heterogeneous habitat, with mixtures of thick scrub, trees and grassy clearings. This would encourage biodiversity by providing habitat, foraging and shelter for wildlife along with facilitating habitat connectivity. More details on planting regimes are provided in Chapter 4: LVIA, Paragraph 4.6.6.

⁴¹ Bat Conservation Trust (2018) Guidance Note 08/18. Bats and Artificial Lighting in the UK: Bats and the Built Environment series.

⁴² SNH (2001). Scotland's Wildlife: Badgers and Development. Available at: http://www.badgerland.co.uk/help/snh_badgers_develop.pdf

⁴³ Forestry Commission Scotland, 2009. The Scottish Government's Policy on Control of Woodland Removal [online]. Accessed at: <https://scotland.forestry.gov.uk/images/corporate/pdf/control-of-woodland-removal.pdf>

Bats

- 7.8.3 Temporary and permanent lighting designs sensitive to bat species should be used during construction and operation of the proposed development as per the Bat Conservation Trust (BCT) best practice guidelines⁴⁴. For example; Using low pressure sodium lights with UV filters and directing the new artificial light sources away from woodland and linear habitats (e.g. hedgerows) would minimise disturbance for foraging and commuting bats.

Badger, otter and water vole

- 7.8.4 Access to the Swine Burn should be maintained through the temporary diversion (See Chapter 6: Drainage Water) of the watercourse during construction of the proposed culvert to allow the movement of foraging and commuting otter and water vole. During installation of the culvert, permanent mammal ledges should also be installed on either side of the culvert to allow continued safe passage for badger, otter and water vole, which have been recorded within the site. The culvert and mammal ledges should be installed following best practice guidance^{45 46}. Mammal ledges should be installed above the water level and provide a minimum of 60 cm of headroom and be at least 60 cm wide. If the ledge is above the bank height, an access ramp should be installed with fencing to guide animals onto the ledge. Planting on the bank around the culvert would also help to re-establish vegetation cover, provide shelter and encourage mammals to use the mammal ledge under the culvert. Planting on the bank would also reinstate suitable water vole habitat.

7.9 Assessment of Residual Effects***Residual Construction Effects****Badger*

- 7.9.1 Residual effects on badgers are considered in detail in Technical Appendix 7.3: Confidential Assessment and Mitigation. A minor adverse residual effect is predicted, however, as badgers are active across the area and the features impacted are not considered to be of critical importance to the badgers of this area, the residual effect is not considered to be significant.

Bats

- 7.9.2 Following inspection of any trees with low bat roost potential by a licensed bat ecologist where deemed necessary these would be soft felled to avoid the accidental injury or death of potentially undetected bats. Note that felling should occur outside of the hibernation season (November-March). A method statement would also be prepared to detail actions required if bats are found during felling.
- 7.9.3 A sympathetic lighting regime (e.g. use of low-pressure sodium lights, directed away from woodland and hedgerows as per BCT guidance⁴⁷) would minimise the disturbance of foraging and commuting bats, resulting in no effects.

⁴⁴ Bat Conservation Trust, 2018. Bats and Artificial Lighting in the UK; Guidance Note 08/18 Bats and the Built Environment Series.

⁴⁵ Scottish Environment Protection Agency, 2010. River Crossing Guide [online]. Accessed at: <https://www.sepa.org.uk/media/151036/wat-sg-25.pdf> (Accessed on 18/09/18).

⁴⁶ The Highways Agency *et al.*, 2001. Design Manual for Roads and Bridges, Volume 10, Section 4, Part 4: Nature Conservation Advice in Relation to Otters [online]. Accessed at: <http://www.standardsforhighways.co.uk/ha/standards/dmr/vol10/section4/ha8199.pdf> (Accessed on 18/09/18).

⁴⁷ Bat Conservation Trust, 2018. Bats and Artificial Lighting in the UK; Guidance Note 08/18 Bats and the Built Environment Series.

Residual Operational Effects

Badger

7.9.4 The installation of badger proof fencing would avoid or greatly reduce vehicle collisions, thereby avoiding any significant residual operational effects.

Bats

7.9.5 A sympathetic lighting regime would minimise the chance of disturbance to foraging and commuting bats, thereby avoiding any significant residual operational effects.

7.10 Summary

7.10.1 This chapter has considered potential impacts on ecological features, such as designated nature conservation sites, habitats and protected species in line with best practice guidance from CIEEM.

7.10.2 The study area was surveyed in 2018 to provide updated baseline information on habitats and faunal species. The dominant habitats recorded within the study area are arable farm land and improved grassland. There are areas of plantation broadleaved woodland, semi-natural broadleaved woodland and semi-improved neutral grassland within the site, namely along the existing M9 embankments. Ancient Woodland is present within the south east section of the site. Signs of badger, three trees with low BRP, four ponds unsuitable for GCN and habitat suitable for breeding birds was also recorded within the site.

7.10.3 The study area was resurveyed in 2019 for protected species. Details of these results, assessment and mitigation are confidential therefore detailed in confidential Technical Appendices 7.2 and 7.3.

7.10.4 Without appropriate mitigation, significant effects are likely for badger, bats and nesting birds. Following the application of mitigation, no residual effects are predicted.

7.10.5 Table 7.7 provides a summary of the anticipated residual effects associated with ecology and nature conservation that are likely to arise as a result of the proposed development.

Table 7.7: Summary of Residual Effects				
Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect	Outcome
Construction				
Disturbance of badger sett (if applicable)	Establish disturbance buffer area around setts OR exclusion of sett under SNH licence if required.	Ecologists to mark out 30 m buffer from sett Ecologists to exclude sett under SNH licence if required.	Minor adverse	Not significant
Badger collision with construction traffic	Badger proof fencing	To be installed along the base of the embankment which follows the east bound merge slip road and the B8020 heading north.	No effect	Not significant
Felling of trees causing injury/death to roosting bats	Soft felling to reduce risk of injury/death to roosting bats	Soft felling- limbs cut and left grounded over night to allow bats to escape. Felling to be supervised by ecologist with bat licence under EcoW.	No effect	Not significant

Table 7.7: Summary of Residual Effects

Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect	Outcome
		Method statement prepared to detail action plan if bats are found during felling.		
Lighting causing disturbance to foraging / commuting bats	Implication of bat friendly lighting regime during construction.	Lighting regime should be designed to be sympathetic to foraging and commuting bats (e.g. low pressure sodium lights, directed away from woodland and hedgerows as per BCT guidance ⁴⁸)	No effect	Not significant
Destruction of/distrubance to nesting birds during vegetation removal	If works occur within breeding bird season (Mar-Aug) then an ecologist will need to check vegetation for active birds nests prior to any removal. Removal of vegetation must occur within 48 hours of the nest check. Works will not be permitted within 10 m of nests if nests are found.	Ecologist to check for nesting birds within 48 hours prior to vegetation removal. If nest are found the ecologist will impement a 10 m exclusion zone within which no clearance works can occur. Clearance can only resume once chicks have safely fledged the nest (to be confirmed by ecologist).	No effect	Not signficiant
Operation				
Badger collision with traffic (due to increased flow)	Fencing	Badger proof fencing to be installed to prevent badgers accessing high traffic areas	No effect	Not significant
Lighting causing disturbance to foraging / commuting bats	Implication of bat friendly lighting regime during operation	Lighting should be designed to be sympathetic to foraging and commuting bats (e.g. low pressure sodium lights, directed away from woodland and hedgerows as per BCT guidance)	No effect	Not significant

⁴⁸ Bat Conservation Trust, 2018. Bats and Artificial Lighting in the UK; Guidance Note 08/18 Bats and the Built Environment Series.