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## 6. Ecology and Nature Conservation

### 6.1. Introduction

- 6.1.1. This section of the Environmental Statement considers the impact the proposed scheme will have on ecology and nature conservation interests in the study area. This assessment outlines the baseline conditions and assesses the potential impacts on designated sites, habitats, mammals, birds, reptiles, fish, aquatic invertebrates and amphibians to determine any mitigation measures required.
- 6.1.2. The desk study area is determined to be 2km either side of the proposed alignment and the survey area is determined to be 500m either side of the proposed alignment.
- 6.1.3. A number of ecological surveys were undertaken between July 2012 and May 2013 to assess the baseline flora and fauna within the study area. The survey reports are contained within Appendix C and include a Phase 1 habitat survey, ornithological assessment, electrofishing & invertebrate, badger, bat, otter and water vole survey reports.

### 6.2. Methodology

- 6.2.1. Wildlife legislation is aimed at protecting habitats and species from disturbance and harm. Together with legislation there are a number of conservation initiatives to actively conserve the natural environment and enhance habitats.

#### **Policies**

##### The UK Biodiversity Action Plan (1994)

- 6.2.2. The world-wide aim of conserving biodiversity began at the 'Earth Summit' in Rio de Janeiro in 1992 where the Convention on Biological Diversity was one of the initiatives. At the Rio summit, the UK was one of 150 governments to sign up to the convention. To achieve its commitment the UK government published the UK Biodiversity Action Plan (UKBAP) in 1994.
- 6.2.3. Otter, water vole, seven species of bat and 59 species of bird have a Species Action Plan in place under the UKBAP.

##### The Scottish Biodiversity Strategy (2004)

- 6.2.4. In Scotland the Scottish Biodiversity Forum was set up to translate the UKBAP into specific action plans for Scotland. The forum has produced 'Scotland's Biodiversity – It's in Your Hands', a strategy for the conservation and enhancement of biodiversity in Scotland. The strategy maps out a 25 year framework for action to conserve and enhance biodiversity for the health, enjoyment and well-being of all the people of Scotland.

##### The Scottish Biodiversity List (2005)

- 6.2.5. The Scottish Biodiversity List is a list of animals, plants and habitats that are considered to be of principal importance for biodiversity conservation in Scotland. The list was published in 2005 to satisfy the requirement under the Nature Conservation (Scotland) Act 2004.

- 6.2.6. Otter, water vole, nine species of bat and 105 species of bird are a Scottish Biodiversity List species.

Ayrshire Biodiversity Action Plan (2007-2010)

- 6.2.7. The first Ayrshire Local Biodiversity Action Plan (LBAP) was completed in 2001 and covered an action plan for 2001-2005. The original Ayrshire LBAP included 26 Habitat Action Plans and 11 Species Action Plans. Since the original Ayrshire LBAP, The Scottish Biodiversity Strategy and Scottish Biodiversity List implementation has seen the need for the Ayrshire Plan to undergo a revision. The Ayrshire Biodiversity Action Plan was completed in 2007.

- 6.2.8. Otter, water vole, common pipistrelle and numerous bird species are a Key Ayrshire Species on the Ayrshire Biodiversity Action Plan.

UK Post-2010 Biodiversity Framework

- 6.2.9. This framework is designed to show how the four countries of the UK achieve the targets and the aims of the EU Biodiversity Strategy. It highlights where work in the UK contributes to international obligations and activities required at a UK level to complement these strategies. The development of the framework reflects a revised direction for nature conservation, towards an approach which aims to consider the management of the environment as a whole, and to acknowledge and take into account the value of nature in decision making.

EU Biodiversity Strategy 2011

- 6.2.10. In May 2011, the European Commission adopted a new strategy to halt the loss of biodiversity and ecosystem services in the EU by 2020, in line with the commitments made at the 10<sup>th</sup> meeting of the Convention on Biological Diversity (CBD) in 2010. The strategy contains six targets and 20 actions. The targets cover:

- Full implementation of EU nature legislation to protect biodiversity;
- Better protection for ecosystems, and more use of green infrastructure;
- More sustainable agriculture and forestry;
- Better management of fish stocks;
- Tighter controls on invasive alien species; and
- A bigger EU contribution to averting global biodiversity loss.

**Legislation**

The Habitats Directive 1992

- 6.2.11. The Habitats Directive (92/43/EEC) on the conservation of natural habitats and of wild fauna and flora exists to promote the maintenance of biodiversity in Europe. The Directive provides for the creation of a network of protected areas across the continent, and the annexes to the document list habitats and species of importance in a Europe-wide context.

The Bird Directive 1979

- 6.2.12. The Birds Directive 1979 (2009/147/EC) ensures protection for all of Europe's wild birds, identifying 194 species and sub-species as particularly threatened and in need of special conservation measures.

Conservation (Natural Habitats &c.) Regulations 1994 (as amended)

- 6.2.13. The Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2012 have recently replaced The Conservation (Natural Habitats, & c.) Regulations 1994, and now constitute the UK Government's implementation of the Habitats Directive. The Conservation Regulations provide for the designation of both Special Protection Areas (SPAs) (first established under the Birds Directive, 1979) and Special Areas for Conservation (SACs) as part of the Natura 2000 network of protected areas across the European Union.

- 6.2.14. The Regulations also provide for the protection of a number of species. The species protected include otter *Lutra lutra*, all species of bat and the great crested newt *Triturus cristatus*; as these are European Protected Species (EPS).

Wildlife and Countryside Act 1981 (as amended)

- 6.2.15. The Wildlife and Countryside Act 1981 (as amended) is the principal mechanism for the legislative protection of wildlife in Britain. This legislation is the means by which the Convention on the Conservation of European Wildlife and Natural Habitats and the European Union Directives on the Conservation of Wild Birds (79/409/EEC) are implemented in Great Britain. Similar legislation is enacted to fulfil these obligations elsewhere in the United Kingdom. The Act is divided into four parts.

- Part 1 is concerned with the protection of wildlife
- Part 2 relates to the countryside and national parks (and the designation of protected areas)<sup>4</sup>
- Part 3 covers rights of way
- Part 4 deals with the miscellaneous provisions of the Act

- 6.2.16. The Wildlife and Natural Environment (Scotland) Act 2011 changed the release offences in the Wildlife and Countryside Act 1981 (as amended) and added new sections on keeping, notifications and control.

The Nature Conservation (Scotland) Act 2004

- 6.2.17. The Nature Conservation (Scotland) Act 2004 imposes a wide ranging duty on Scotland's public sector to conserve biodiversity and protect the Nation's precious natural heritage. Implementation is linked to a national biodiversity strategy that is endorsed by the Scottish Government. The Act strengthens protection for Sites of Special Scientific Interest and increases fines for intentional or reckless damage.

- 6.2.18. Badgers and their setts are protected by The Protection of Badgers 1992. This Act was amended by the Nature Conservation (Scotland) Act 2004.

#### **Phase 1 Habitat Survey**

- 6.2.19. A Phase 1 habitat survey of the proposed route was undertaken to provide a record of semi-natural vegetation and wildlife habitat over large areas of the countryside.
- 6.2.20. The survey was carried out in accordance with the Joint Nature Conservation Committee's Handbook for Phase 1 Habitat Survey (1993)<sup>5</sup> and existing information relevant to Phase 1 habitat surveys was sought on designated sites, species records and maps and descriptions of local wildlife interest.
- 6.2.21. Although drawings were produced to accompany the Phase 1 habitat survey report, they were produced with the intention of indicating and classifying occurrences of semi-natural habitats. It is not to be regarded as a definitive representation of the conservation value or interest of any piece of land. In particular, the absence of any symbol such as colour code or target symbol should not be taken as denoting lack of conservation value.

#### **Ornithological survey**

- 6.2.22. Winter and breeding bird surveys were carried out to gain an understanding of the diversity of bird species present within the survey area.
- 6.2.23. The methodology was closely based on that adopted by the British Trust for Ornithology's Common Bird Census (Bibby et al 2000)<sup>6</sup>. The survey area was walked slowly with all bird species seen and heard recorded electronically using a 'go-book', global positioning system (GPS) and Arc Pad geographical information system (GIS) software. Details of the movements and activities of the birds were noted where appropriate.
- 6.2.24. Weather conditions were not optimal on all surveys, which may have impacted the activity of certain species and human error may have resulted in certain species being missed.

#### **Electrofishing and Aquatic Invertebrate Survey**

- 6.2.25. Electrofishing and invertebrate surveys were carried out to assess and quantify existing fish populations and to sample aquatic invertebrates.
- 6.2.26. Fish populations at each of the selected sites were assessed using electrofishing. This is a widely used technique to examine freshwater fish communities. The method uses electricity to attract and stun fish, which allows operators to remove them from the water. The fish are transferred to a holding container until they have recovered and then anaesthetised using a mild solution of MS222 (Tricaine Methane Sulphonate). Each individual is then identified, measured and returned unharmed to the area from which they were captured.
- 6.2.27. Electrofishing techniques are specifically designed for assessing juvenile salmonid populations therefore fish from other groups may not be quantified effectively.

<sup>5</sup> Joint Nature Conservation Committee (1993), Revised Reprint 2010, Handbook for Phase 1 habitat survey – a technique for environmental audit  
<sup>6</sup> Bibb, C.J., Burgess, N. D. 2000. Bird Census Techniques. Second Edition. Academic Press. London

6.2.28. It is usually impossible to capture all the fish present within a site, therefore depletion sampling, where fish are removed from a site in a series of successive electrofishing runs, are used to provide an estimate of the total fish population present. The rate of decline in each run and the total number of fish captured are used to estimate fish stocks. However, if fish numbers are low the confidence limits will be wide and the depletion estimates will be unreliable.

6.2.29. It is considered impossible to prove the absence of fish by electrofishing therefore, whilst the failure to capture fish at a site may indicate that the population is low, it cannot be assumed that fish are necessarily absent.

#### **Badger Survey**

6.2.30. The objectives of the badger survey were to identify and record all evidence of badger activity in the areas identified during the Phase 1 habitat survey.

#### **Bat Survey**

6.2.31. Bat surveys were carried out to identify the presence of bat species, how bats utilise the proposed route and to identify any roosts which may be affected by the scheme.

6.2.32. The methodology used for the survey is set out in the Bat Conservation Trust (2007) Bat Surveys: Good Practice Guidelines<sup>7</sup> and the Bat Workers Manual, 3rd Edition, 2004<sup>8</sup>.

#### **Otter Survey**

6.2.33. Otter surveys were carried out to identify record and gain an understanding of otter activity within the survey area.

6.2.34. The survey methodology was derived and adapted from three guidance documents – the Design Manual for Roads and Bridges (DMRB, 2001)<sup>9</sup>, Monitoring the Otter (Chanin, 2003)<sup>10</sup> and Otters & Development (Green R & Green J)<sup>11</sup>.

6.2.35. The absence of field signs does not necessarily signify that otter are not present. Ideally an otter survey should be undertaken over a longer time period to account for seasonal variations within otter activity. Otters may use different areas at different times of year and this must be taken into account. However, due to time restraints of the scheme delivery all surveys were undertaken within one month.

#### **Water vole survey**

6.2.36. The objectives of the water vole survey were to identify and record all evidence of activity in the watercourses identified during the Phase 1 habitat survey.

6.2.37. Surveying was carried out in accordance with the methodology outlined in the Water Vole Conservation Handbook (Strachan & Moorhouse, 2006)<sup>12</sup>.

<sup>7</sup> Bat Conservation Trust 2007, Bat Surveys: Good Practice Guidelines. Bat Conservation Trust, London.

<sup>8</sup> Mitchell-Jones, A.J. and McLeish, A.P., 2004. The Bat Workers Manual; Third Edition. Joint Nature Conservation Committee: Peterborough.

<sup>9</sup> The Design Manual for Roads and Bridges (2001), *Nature Conservation Advice in Relation to Otters*, Volume 10, Section 4, Part 4, HA 81/99

<sup>10</sup> Chanin P (2003) Monitoring the Otter (Lutra lutra) *Conserving Natura 2000 Rivers*, Monitoring series No. 10. English Nature, 2003

<sup>11</sup> Green R & Green J, *Otters & Development*, Scottish Natural Heritage, available from: <http://www.snh.org.uk/publications/online/wildlife/otters/default.asp>

- 6.2.38. Lack of evidence of water vole activity does not necessarily preclude presence at a later date.

**Consultation**

- 6.2.39. Consultations were carried out with relevant statutory and non-statutory organisations to provide a detailed understanding of the survey area's ecology. Consultation replies were available from Scottish Natural Heritage (SNH), Ayrshire Rivers Trust (ART) and Scottish Badger. Consultees' views concerning the proposed scheme will be taken into consideration as part of the detailed design. Further details on the consultees and responses can be found in Chapter 3 – Consultation.

**Assessment**

- 6.2.40. This assessment was carried out in accordance with the Design Manual for Roads and Bridges (DMRB), volume 11, Section 3, Part 4, Ecology and Nature Conservation. This assessment has also been undertaken in accordance with the guidance set out in the Institute of Ecology and Environmental Management's (IEEM) Guidelines for Ecological Impact Assessment (2006) in order to provide clear and concise information about the likely ecological effects associated with the scheme. The determination of impact significance considers sensitivity of existing resources to change as represented by the value or importance of the feature and the magnitude of change.
- 6.2.41. Sensitivity is determined using a five-point scale as outlined in Chapter 2 - Methodology, Table 2.1 – Determination of Receptor Sensitivity.
- 6.2.42. The magnitude of potential effects on ecology and nature conservation caused by the route alignment has been rated using the classifications and criteria outlined in Chapter 2 - Methodology, Table 2.2 – Determination of Impact Magnitude.
- 6.2.43. Impact significance is determined using a combination of receptor sensitivity and magnitude of change on ecology and nature conservation within the scheme. Five levels of significance were defined which apply equally to beneficial and adverse impacts. Table 2.4 – Determination of Impact Significance of Chapter 2 – Methodology, illustrates the significance of impacts matrix which is used to derive the overall impact.
- 6.2.44. In addition to these assessment methods, the value and significance of the habitats found was assessed on a regional scale developed from Ratcliffe Criteria and SNH guidelines for the selection of SSSI's, which addresses regional, national and internationally important sites. These categories are detailed as follows:
- Low – Areas which support limited semi-natural communities of low conservation value, for example species-poor hedges, poor semi improved grassland or recent woodland. Impact on such habitats can generally be readily mitigated through careful design and habitat creation.

<sup>12</sup> Strachan, R. and Moorhouse, T. (2006), *Water Vole Conservation Handbook*. 2<sup>nd</sup> edition. Wildlife Research Conservation Unit, Oxon.

- Local – Areas which have a good floristic diversity of common species and a good semi-natural character. These areas are generally only re-creatable in the long term. Features such as diverse mature hedgerows, small areas of mature semi-natural woodland and semi-improved neutral grassland would be retained to minimise adverse impacts.
- District – Habitats which are often relatively large with a high floristic diversity and habitat quality. Such areas cannot generally be re-created, and together with the categories below, should be treated as a major development.
- County – Areas with a high floristic and/or faunal interest. These would include, for example ancient woodland and ancient green lanes, diverse unimproved grasslands supporting county rare species. These areas are generally not re-creatable and impacts of this level of significance are difficult to mitigate effectively.
- National – Areas which house nationally rare vegetation communities or species. Most of these are designated as SSSI and as such are almost always not fully re-creatable and impact is difficult to be fully mitigated.
- International – Areas designated or selected for designation such as Special Protection Areas (SPAs), Special Areas of Conservation (SACs) or Wetlands of International Importance (Ramsar sites), and as such prove extremely challenging to mitigate against adverse effects.

6.2.45. In addition, each section of the study area was evaluated to provide an assessment of their ornithological value. This assessment took into account a number of criteria, including the rarity of the species in question, on an international, national and local scale, the diversity of species present and the quality of the surrounding habitat.

6.2.46. The rarity of species present on site was assessed using a five tier system:

- 1) Annex 1 Species – These are rare breeding European birds, which are afforded special protection under Annex 1 of the EC Birds Directive (79/409/EEC).
- 2) Schedule 1 & Schedule 6 Species – These are rare breeding UK birds, which are afforded special protection under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 6 of the Nature Conservation (Scotland) Act 2004.
- 3) Red List Species – These are listed by the RSPB as species of high national conservation concern. Species are included on this list if they meet one or more of the following criteria:
  - Globally threatened
  - Historical population decline in UK during 1800 – 1995
  - Rapid (>50%) decline in UK breeding population over last 25 years
  - Rapid (>50%) contraction of UK breeding range over last 25 years

- 4) Amber List Species – These are listed by the RSPB as species of medium national conservation concern. Species are included on this list if they meet one or more of the following criteria:
- Historical population decline during 1800-1995, but now recovering with population size having more than doubled over the last 25 years
  - Moderate (25-49%) decline in UK breeding population over the last 25 years
  - Moderate (25-49%) contraction of UK breeding range over the last 25 years
  - Moderate (25-49%) decline in UK non-breeding population over the last 25 years
  - Species of European Conservation Concern
  - Five year mean of between only one and 300 breeding pairs in the UK
  - > fifty percent of the UK breeding population in ten or fewer sites
  - > fifty percent of the UK non-breeding population in ten or fewer sites
  - > twenty percent of the European breeding population in the UK
  - > twenty percent of the NW European (wildfowl), East Atlantic Flyway (waders) or European (others) non-breeding populations in the UK.
- 5) Green List Species – This list includes those species listed as recovering from historical decline in the last review that have continued to recover and do not qualify under and of the other criteria.

## **6.3. Baseline Conditions**

### **Designated Sites**

- 6.3.1. Multi-Agency Geographic Information for the Countryside (MAGIC, 2012) website brings together information on key environmental schemes and designations in one place. To ensure that requirements to conserve natural habitats and wild flora and fauna under the Conservation (Natural Habitats &c) Regulations 1994 (as amended) are considered, a search on MAGIC was undertaken to determine the presence of local, national and internationally designated sites within 2km of the scheme site. A search was also carried out for any Special Areas of Conservation (SAC), candidate SAC (cSAC) or provisional SAC (pSAC) sites within 30km with bats as a qualifying interest.



6.3.2. There are no statutory designated sites located within 2km of the site, and no SAC's, cSAC's or pSAC's located within 30km with bats as a qualifying interest. The nearest SAC is located over 20km south east of the scheme. This is Merrick Hells SAC, UK Site Code UK0019841, designated for wet heaths, boreal grasslands and blanket bogs. This is located over 20km from the site, with no suitable linking pathways identified.

6.3.3. As there are no designated sites located within the study area, these are assigned a negligible sensitivity.

#### **Habitats**

6.3.4. A Phase 1 habitat survey was undertaken between 23rd July and 20th September 2012. Appendix D1 contains the survey report and associated drawings.

6.3.5. The survey noted the main habitat types to be improved grassland, semi-improved grassland and arable land. During the majority of the surveys, cattle and sheep were grazing in the improved and semi-improved grassland. Some grassland areas are suitable to support a wide habitat for invertebrates.

6.3.6. There are a number of patches of scrub that can be seen along various fences, watercourses and standing water. This consisted of species such as gorse *Ulex sp.*, hawthorn *Crataegus monogyna* and bramble *Rubus fruticosus*.

6.3.7. Hedgerows are present throughout the survey area, mainly as field boundaries. The most common hedgerow species found throughout is hawthorn. Hedgerows are an important habitat for a number of animals including birds for nesting and foraging and bats for flight paths.

6.3.8. A number of watercourses are present throughout the survey area. These generally run from north to south. Watercourses are a valuable habitat for many species including otter and water vole.

6.3.9. Patches of woodland and individual trees are present within the survey area. These are a mix of broadleaved woodland and mixed woodland. Tree species include oak *Quercus sp.*, birch *Betula sp.*, field maple *Acer campestre* and beech *Fagus sylvatica*.

6.3.10. Following on from the Phase 1 habitat survey, the results presented habitats suitable for further surveys, including birds, mammals and fish. During the survey, no suitable habitat was identified for amphibians or reptiles and therefore no surveys were undertaken for these species.

6.3.11. The habitats within the scheme extents are important on a local level and are therefore assigned a low sensitivity.

#### **Birds**

6.3.12. Winter bird surveys were undertaken between 11th and 17th December 2012. Two visits for breeding birds were undertaken between 20th and 29th March 2013 and 13th to 16th May 2013.

- 6.3.13. During the winter bird survey, a total of 31 different bird species were recorded. Of these 31, 15 species are on the Birds of Conservation Concern's (BoCC) Red and Amber list of conservation concern. These were common gull *Larus canus*; dunnoek *Prunella modularis*; fieldfare *Turdus pilaris*; greylag goose *Anser anser*; grey partridge *Perdix perdix* (also a UKBAP priority species); lesser black-backed gull *Larus fuscus*; linnet *Carduelis cannabina* (also a UKBAP priority species); mallard *Anas platyrhynchos*; mistle thrush *Turdus viscivorus*; redwing *Turdus iliacus* (also a UKBAP priority species); song thrush *Turdus philomelos* (also a UKBAP priority species); skylark *Alauda arvensis* (also a UKBAP priority species); snipe *Gallinago gallinago*; starling *Stumus vulgaris* (also a UKBAP priority species) and yellowhammer *Emberiza citrinella* (also a UKBAP priority species).
- 6.3.14. Two Schedule 1 species were recorded during the winter bird survey, these were fieldfare *Turdus pilaris* and redwing *Turdus iliacus*. A total of 57 fieldfare and 34 redwing were recorded. Flocks of redwing, fieldfare, mistle thrush *Turdus viscivorus* and starling were recorded foraging on the fields and along the hedgerows throughout section 1 of the study area.
- 6.3.15. Flocks of finches including chaffinches *Fringilla coelebs*, linnets, greenfinches *Carduelis chloris* and goldfinches *Carduelis carduelis* were recorded in the study area. These were most abundant in sections 1 and 4 of the study area.
- 6.3.16. During the breeding bird survey, a total of 42 different bird species were recorded. Of these 42, 20 species are on the Birds of Conservation Concern's (BoCC) Red and Amber list of conservation concern. These were greylag goose; mallard, shelduck *Tadorna tadorna*; teal *Anas crecca*; common gull; herring gull *Larus argentatus* (also a UKBAP priority species); lesser black-backed gull; curlew *Numenius arquata*; snipe; house martin *Delichon urbica*; swallow *Hirundo rustica*; grey wagtail *Motacilla cinerea*; meadow pipit *Anthus pratensis*; fieldfare; song thrush *Turdus philomelos* (also a UKBAP priority species); linnet (also a UKBAP priority species); yellowhammer (also a UKBAP priority species); starling (also a UKBAP priority species); house sparrow *Passer domesticus* (also a UKBAP priority species); skylark *Alauda arvensis* (also a UKBAP priority species) and tree sparrow *Passer montanus* (also a UKBAP priority species).
- 6.3.17. The most abundant species recorded during the breeding bird survey were chaffinch, meadow pipit and yellowhammer. The yellowhammer population is large, and significant due to their conservation status. Moderate numbers of blackbird *Turdus merdula*, robin *Erithacus rubecula*, dunnoek *Prunella modularis* and wren *Troglodytes troglodytes* were recorded.
- 6.3.18. Along the proposed route, areas of ornithological importance were highlighted and sub-divided into three categories of high, moderate and low. There are four areas of high ornithological importance; five areas of moderate ornithological importance and one area of low ornithological importance (shown in Appendix D2 - Ornithological Assessment Report).

- 6.3.19. The habitat surrounding the scheme is suitable for barn owl *Tyto alba* due to the presence of open grassland and arable land for feeding with small areas of woodland. The presence of nest boxes on Lover's Lane, and pellets found throughout the site suggest that they are present. Barn owls are a Schedule 1 species and on the Birds of Conservation Concern (BoCC) amber list.
- 6.3.20. The survey area is considered to be of district ornithological importance as it supports small breeding populations of a number of both RSPB red and amber listed birds of conservation concern as well as providing valuable, diverse habitats including arable land; buildings; woodland; scrub; hedgerows and grassland.
- 6.3.21. Due to the presence of red listed, amber listed Birds of Conservation Concern, Schedule 1 species and UK Biodiversity Action Plan Species breeding and utilising the area, birds have been assigned a high sensitivity.

#### **Fish**

- 6.3.22. Electrofishing surveys and invertebrate surveys were undertaken between 6th September and 10th September 2012.
- 6.3.23. Salmon *Salmo salar*, brown trout *Salmo trutta* and eel *Anguilla angilla* were recorded on four of the watercourses within the scheme; Brockloch Burn, Chapelton Burn, Abbeymill Burn and Barlewan Burn. Stone Loach *Barbatula barbatula* and three-spined stickleback *Gasterosteus aculeatus* were recorded on the Chapelton Burn, Abbeymill Burn and Barlewan Burn. Minnows *Phoxinus phoxinus* were recorded in the Barlewan Burn. The burns with fish species recorded are shown on Drawing No. 25000182/ENV/6.1.
- 6.3.24. Salmon, trout and eel are UK BAP species; salmon and trout are protected under the Salmon and Freshwater Fisheries Act 1975, Salmon are an Annex 2 species, Eel are also covered under the Eel Management plans for the United Kingdom 2010 and all species are of national value. As a result of their presence within the watercourses in the scheme, according to Table 2.1: Determination of Receptor Sensitivity, they are assigned a high sensitivity.
- 6.3.25. Six watercourses were surveyed for invertebrates as detailed in Appendix D3, the results of which varied widely between the sites reflecting different pollution pressures on each. Three were score A1 a high score, one was B1, one C1 and one C3 a very low score therefore collectively the sensitivity of invertebrates is assessed as medium.

#### **Mammals**

##### Badger

- 6.3.26. Badger surveys were carried out between 6th March and 17th April 2013 (further detail Appendix D4).
- 6.3.27. The habitats surrounding the proposed route and the wider area were considered to be favourable habitat for badger, with arable fields and open grassland providing good foraging areas and pockets of woodland and scrub providing sheltered areas for setts.

- 6.3.28. During the surveys, multiple badger field signs were recorded including pathways, guard hair on fences, setts, dung pits, latrines, bedding, scratching posts and a badger skull.
- 6.3.29. Three annex setts and two outlier setts were recorded within the survey area.
- 6.3.30. Badgers are protected in the UK. Due to the high level of badger activity within the survey area, and the discovery of badger setts within the vicinity of the proposed alignment, badgers are assigned a high sensitivity.

#### Bat

- 6.3.31. Bat surveys were undertaken between 14th May and 19th June 2013. These surveys were undertaken within the vicinity of Gardenrose Path, Lover's Lane and north of the railway line at Nether Culzean. A bat survey report and associated drawings can be found in Appendix D5.
- 6.3.32. A small amount of bat activity was recorded along the tree line at Gardenrose Path. Several bats were heard for a limited amount of time but none were observed emerging from the trees. They were first recorded shortly after sunset, and it is therefore assumed their roost is close by, most likely within the loft space of one of the nearby properties.
- 6.3.33. No roosts were present within the trees on Gardenrose Path, between national grid references (NGR) NS 29401 10540 and NS 29501 10469.
- 6.3.34. A limited amount of activity was recorded in the area to the north of the railway line at Nether Culzean. It is thought that this is due to the presence of woodland immediately to the south of the railway line, which would be a favoured habitat and place for bat roosting potential.
- 6.3.35. No roosts are present within the trees to the north of the railway line at Nether Culzean, between NGR NS 31041, 11138 and NS 31481, 11589.
- 6.3.36. A large amount of bat activity was recorded in the area of Lover's Lane. During the surveys, more focus was attributed on the large oak tree, NGR NS 30451, 10868, which is immediately opposite Lover's Lane, due to the need for the removal of this tree. In this area, bats utilise the hedgerows for flight paths and often use the large oak to feed. Many of the bats were heard and seen very soon after sunset and it is therefore assumed they are utilising the trees between Alloway Road and Lover's Lane to roost. None of the affected trees in this area, requiring removal were found to have bat roosts present.
- 6.3.37. Bats are a European Protected Species (EPS). During the surveys, no bat roosts were identified within the proposed alignment however the bat activity was of a moderate level, with trees and hedgerows being used for feeding and flight paths. As a result, bats are assigned a medium sensitivity, with the potential need for further, in-depth surveys.

#### Otter

- 6.3.38. Otter surveys were undertaken between 9th April and 16th April 2013 (further detail Appendix D6).

- 6.3.39. The habitats surrounding the proposed route and the wider area were considered to be favourable habitat for otter. The watercourses that flow through the centreline of the proposed route were considered to be favourable habitat for otter, with a variety of foraging habitats and potential resting sites.
- 6.3.40. On one of the watercourses next to the culvert under the B7024 Alloway Road, old spraint was recorded at two locations, with fish bones visible in the spraint. A suspected resting place was noted adjacent to spraint further east along the same watercourse. This site was next to a boundary wall and had flattened grass where otter may have been lying up. At the lower reaches of this watercourse, near to the railway line, recent otter spraint was recorded.
- 6.3.41. An otter holt was recorded on the railway embankment, adjacent to a drainage culvert under the embankment, close to Smithston Bridge. Fresh spraint was recorded next to the entrance.
- 6.3.42. Fresh spraint was recorded on Chapelton Burn near to where the burn crosses under the existing A77. Feeding remains were also recorded along this burn. Adjacent to the feeding remains, a large amount of fresh spraint had been deposited on a mole hill.
- 6.3.43. A large amount of spraint was recorded near to the feeding remains on a boulder at the edge of Brockloch Burn. The burn flows through woodland north of Bankend Bridge, immediately to the north of this four spraint sites were recorded.
- 6.3.44. Otter are active on many of the watercourses and habitat, through which the proposed route will pass. It is likely that otter use the watercourses within the survey area seasonally, with the exception of Chapelton Burn to the north west of Maybole which is considered to be used all year round.
- 6.3.45. Otter are a European Protected Species (EPS), UK Biodiversity Action Plan (UKBAP) species and a Scottish List species. Due to the high otter activity within the survey area including numerous resting places, a holt and evidence of feeding, otter are assigned a very high sensitivity.

Water vole

- 6.3.46. Water vole surveys were undertaken between 9th April and 16th April 2013 (further detail Appendix D7).
- 6.3.47. No field signs were recorded on any of the suitable habitats identified during the Phase 1 habitat survey as having potential to support water vole.
- 6.3.48. As no water vole were recorded, their sensitivity is assigned as negligible.

## 6.4. Impact Assessment

### During Construction

#### Designated Sites

- 6.4.1. No designated sites will be impacted directly or indirectly during construction as a result of the works, as none are present within 2km of the site, with the nearest being located approximately 20km south east. The impact magnitude on designated sites during construction is assessed as no change and therefore the overall impact significance is determined to be neutral.

#### Habitats

- 6.4.2. At the start of the scheme, national grid reference (NGR) NS 28848 09551, the proposed scheme route will bisect nine fields of improved grassland until it reaches NGR NS 30752 10981, east of Lover's Lane. A large number of hedgerows with trees will also be bisected as a result of the proposed scheme.
- 6.4.3. From NGR NS 30752 10981, east of Lover's Lane, travelling north east, the proposed scheme bisects three fields of arable land, until it reaches NGR NS 31230 11302. These are used for growing barley. The proposed scheme does not bisect these fields through the middle, only through their north west end.
- 6.4.4. From NGR NS 31230 11302 until near the northern scheme extent, the proposed scheme bisects nine fields of semi-improved grassland. The majority of these are divided to the north west of the fields. Within this area, a large number of hedgerows will also be bisected or removed entirely as a result of the proposed scheme.
- 6.4.5. Where the northern tie in roundabout is to be located, at NGR NS 32082 12933, the land which will be lost here comprises of marshy grassland.
- 6.4.6. As the proposed scheme is situated in a rural area, with large amounts of similar habitats surrounding, in accordance with Table 2.2: Determination of Impact Magnitude, the magnitude of the proposed scheme on habitat is assessed as minor. The overall impact significance on habitats during construction, according to Table 2.4: Determination of Impact Significance is therefore assessed as slight.

#### Birds

- 6.4.7. The proposed scheme involves the part removal of a large number of hedgerows. The hedgerows throughout the scheme are important for breeding and wintering birds as they are used to forage, for nesting and for protection from predators. A small amount of trees will also be lost as a result of the proposed scheme. Removal of these areas will remove important bird habitats.
- 6.4.8. Noise during construction will also affect the bird populations, as it will disturb them, reducing their numbers.

- 6.4.9. In accordance with Table 2.2: Determination of Impact Magnitude, the magnitude of the proposed scheme during construction on birds is assessed as moderate. The overall impact significance on birds during construction, according to Table 2.4: Determination of Impact Significance is therefore assessed as moderate.

#### Fish

- 6.4.10. There is potential for the watercourses within the scheme extents to become polluted during construction. This pollution can occur either through a point source pollution incident such as a fuel spillage, but also through more gradual pollution such as siltation, through excavation material entering the watercourse.
- 6.4.11. Potential for pollutants to enter any of the watercourses would be highest during the construction of any of the bridge structures and culverts. Potential pollutants to surface water runoff include:
- Concrete, cement or admixture spillage from construction of the new carriageways and bridges.
  - Sediment run-off from earthworks required for construction of new carriageways, bridges and culverts.
  - Sediment runoff water or wind-blown dust from spoil heaps.
  - Leakage or spillage of fuel, oil or chemicals.
- 6.4.12. Sedimentation can have an adverse impact on the water quality and in turn, affect the in-stream flora and fauna. Suspended solids can also significantly reduce dissolved oxygen levels within the water and this could have adverse effects on fish.
- 6.4.13. In accordance with Table 2.2: Determination of Impact Magnitude, the magnitude of the proposed scheme during construction on fish is assessed as moderate. The overall impact significance is therefore assessed as moderate.
- 6.4.14. In accordance with Table 2.2: Determination of Impact Magnitude, the magnitude of the proposed scheme during construction on aquatic invertebrates is assessed as moderate. The overall impact significance is therefore assessed as moderate.

#### Mammals

##### *Badger*

- 6.4.15. The proposed scheme passes directly through an outlier badger sett, which will be destroyed during construction as a result. During the works, badger will need to be excluded from the affected sett for the works to proceed.
- 6.4.16. Work activities such as blasting or pile driving can cause disturbance to badger and their setts at great distances. Other activities such as noise from machinery, site lighting, trenches, chemicals on site, temporary fencing, etc., can all cause disturbance to badger.

6.4.17. Temporary fencing is likely to be erected on site during the works, which could pose a hazard to badgers. They may become trapped within the working area, or have their territories cut off and isolated.

6.4.18. In accordance with Table 2.2: Determination of Impact Magnitude, the magnitude of the proposed scheme during construction on badgers is assessed as major. The overall impact significance is therefore assessed as very large.

*Bat*

6.4.19. During construction, a number of trees, hedgerow and scrub will be removed or cut back. No bat roosts have been confirmed on site, however the removal of this vegetation will result in the loss of foraging habitat and the severance of bat commuting routes.

6.4.20. As the works will take place during the day, the disruption from the works to bats will be reduced.

6.4.21. In accordance with Table 2.2: Determination of Impact Magnitude, the magnitude is determined to be minor. Therefore in accordance with Table 2.4: Determination of Impact Significance, the overall significance of impact on bats during construction is assessed as slight.

*Otter*

6.4.22. During the works, there is potential for the watercourses within the scheme to become polluted. Potential for pollutants to enter any watercourse would be highest during construction of any of the bridge structures and culverts. Potential pollutants to surface water runoff include:

- Concrete, cement or admixture spillage from construction of the new carriageways and bridges.
- Sediment run-off from earthworks required for construction of new carriageways, bridges and culverts.
- Sediment runoff water or wind-blown dust from spoil heaps
- Leakage or spillage of fuel, oil or chemicals

6.4.23. Sedimentation can have an adverse impact on the water quality and in turn, the fauna. Otter utilise the watercourse for living and feeding and if during construction the water quality is affected, fish stocks may be affected and the water too polluted for the otter to swim.

6.4.24. In accordance with Table 2.2: Determination of Impact Magnitude, the magnitude of the proposed scheme during construction on otters is assessed as moderate. The overall impact significance is therefore assessed as large.



*Water vole*

- 6.4.25. Water vole are not considered to be present on site and therefore will be unaffected during construction. In accordance with Table 2.2: Determination of Impact Magnitude, the magnitude is determined to be no change. Therefore in accordance with Table 2.4: Determination of Impact Significance, the overall significance of impact to water vole during construction is assessed as neutral.

Table 6.1 Summary of Impact Assessment During Construction			
Receptor	Sensitivity	Magnitude	Significance
Designated Sites	Negligible	No change	Neutral
Habitats	Low	Minor	Slight
Birds	High	Moderate	Moderate
Fish	High	Moderate	Moderate
Aquatic Invertebrates	Medium	Moderate	Moderate
Badger	High	Major	Very large
Bat	Medium	Minor	Slight
Otter	Very high	Moderate	Large
Water Vole	Negligible	No change	Neutral

**Post Construction**

Designated sites

- 6.4.26. The proposed route does not pass through any designated sites and none will be directly or indirectly affected upon completion of the works. Therefore in accordance with Table 2.2 Determination of Impact, the magnitude of impact on designated sites post construction is assessed as no change. The overall impact significance is neutral.

Habitats

- 6.4.27. The proposed scheme has a total land take of 45ha.
- 6.4.28. The proposed scheme bisects areas of land including improved grassland, semi-improved grassland and arable land.
- 6.4.29. In accordance with Table 2.2: Determination of Impact, the magnitude on habitats post construction is assessed as moderate. The overall impact significance is therefore assessed as slight.

Birds

- 6.4.30. A large amount of habitat, nesting and foraging areas will be lost as a result of the scheme. This area is used by a wide range of bird species and the loss of hedgerows and trees will be significant.

- 6.4.31. In accordance with Table 2.2: Determination of Impact, the magnitude of the impact on birds post construction is assessed as moderate. The overall impact significance is therefore assessed as moderate.

Fish and Aquatic Invertebrates

- 6.4.32. With any road scheme, there is the potential for pollution to occur from the accumulation of pollutants on the road being discharged to watercourses following rainfall events and from accidental spillages of harmful chemicals and materials. The volume of runoff should also be considered to avoid overloading watercourses.
- 6.4.33. Run-off from road drainage may cause pollution to the watercourses within the scheme extents due to accidents, general vehicle and road degradation, incomplete fuel combustion and small oil or fuel leaks.
- 6.4.34. The proposed scheme will result in an increase in road surface area through road widening to facilitate the wide carriageway. Potential impacts on the water resources of the study area may result from increases in road run-off volumes due to the increase in surface area. This scheme is not, however, expected to significantly increase traffic volumes, as no viable alternative routes exist within this area of South Ayrshire, and therefore no additional traffic is expected to be attracted to the improved section.
- 6.4.35. According to Table 2.2: Determination of Impact Magnitude, the magnitude on fish post construction is assessed as negligible. Therefore according to Table 2.4: Determination of Impact Significance, the overall impact on fish post construction is assessed as slight.
- 6.4.36. According to Table 2.2: Determination of Impact Magnitude, the magnitude on aquatic invertebrates post construction is assessed as negligible. Therefore according to Table 2.4: Determination of Impact Significance, the overall impact on aquatic invertebrates is assessed as neutral.

Mammals

*Badger*

- 6.4.37. The loss of a badger sett and the fragmentation of badger territories is an impact on badger in the area. Many badgers may try to cross the proposed route where they would originally have had paths, leading to potential badger fatalities. Badger numbers in the area will decrease as a result.
- 6.4.38. In accordance with Table 2.2: Determination of Impact Magnitude, the magnitude of the impact on badgers post construction is assessed as major. Therefore in accordance with Table 2.4: Determination of Impact Significance, the overall impact on badgers is assessed as large.

*Bat*

- 6.4.39. The dissection of flight paths by the proposed scheme may lead to increase levels of bat road kill, as bats will still try to fly their traditional paths.
- 6.4.40. Potential future roosting sites may also be lost as a result of the proposed route.

6.4.41. In accordance with Table 2.2: Determination of Impact Magnitude, the magnitude of the impact on bats post construction is assessed as minor. Therefore in accordance with Table 2.4: Determination of Impact Significance, the overall impact on bats is assessed as slight.

*Otter*

6.4.42. New culverts and bridge structures are to be built as part of the proposed scheme. Otter may not utilise new culverts and might try to cross the proposed scheme and fall victim to road traffic.

6.4.43. In accordance with Table 2.2: Determination of Impact Magnitude, the magnitude on otter post construction is assessed as minor. Therefore in accordance with Table 2.4: Determination of Impact Significance, the overall impact on otter is assessed as moderate.

*Water vole*

6.4.44. As water voles were not considered to be present on site, it is assumed they will be unaffected post construction. In accordance with Table 2.2: Determination of Impact Magnitude, the magnitude is determined to be no change. Therefore in accordance with Table 2.4: Determination of Impact Significance, the overall significance of impact on water vole post construction is assessed as neutral.

Table 6.2 Summary of Impact Assessment Post Construction			
Receptor	Sensitivity	Magnitude	Significance
Designated Sites	Negligible	No change	Neutral
Habitats	Low	Moderate	Slight
Birds	High	Moderate	Moderate
Fish	High	Negligible	Slight
Aquatic Invertebrates	Medium	Negligible	Slight
Badger	High	Major	Large
Bat	Medium	Minor	Slight
Otter	Very high	Minor	Moderate
Water Vole	Negligible	No change	Neutral

**6.5. Mitigation**

**During Construction**

Designated Sites

6.5.1. No mitigation required.

Habitats

6.5.2. It is recommended, that where possible, as much of the existing habitat and vegetation should be retained to minimise the impact on the various habitats.

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Birds

- 6.5.3. To prevent disturbance to nesting birds, clearance works must not commence during the bird breeding season (March to August inclusive). If works must be undertaken during this season, the vegetation must first be surveyed by a suitably qualified person. This may cause a potential risk to the construction programme; however it will ensure birds are not impacted if clearance is taking place during the breeding season.
- 6.5.4. If active nests are found during clearance, these will need to be left undisturbed until the nesting attempt is complete. This will partially mitigate for potential disturbance, damage or destruction of nests.
- 6.5.5. Best practicable means of noise control, as described within BS 5228-1: 2009 'Code of Practice for noise and vibration control on construction and open sites', should be implemented to minimise the risk of disturbance to nesting birds. The British Standard provides specific detail on suitable measures for noise in respect to construction operations.

Fish and Aquatic Invertebrates

- 6.5.6. Work should only take place within the watercourse between May and October due to the presence of salmonid species and the potential for eggs to be present in the gravel between November and May.
- 6.5.7. Surface water management during the construction phase should be designed to prevent pollution entering watercourses at all times, regardless of prevailing weather conditions.
- 6.5.8. Any temporary culverts should meet with the requirements for fish passage and migration.
- 6.5.9. On-going monitoring of salmonid populations at the previous survey locations is essential, to detect and allow early intervention of impact arising from construction activities.
- 6.5.10. Further detail on water pollution prevention can be found within Chapter 12: Road Drainage and the Water Environment.

Mammals

*Badger*

- 6.5.11. An exclusion licence will be required from SNH which can licence the exclusion of badger from their sett followed by its immediate destruction. Exclusion of the badgers from the sett can be achieved by a combination of badger-proof fencing and/or specially designed one-way gates which allow the badgers to exit their setts, but prevent re-entry.
- 6.5.12. Through consultation with SNH, artificial setts will need to be constructed to mitigate for the loss of the sett. This needs to be within the same territory, with the most successful artificial setts being located less than 100m from the original sett, and constructed at least six months before the badgers are excluded, giving them time to investigate their new sett. The exact location of the sett will be approved by SNH through the licensing process.

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- 6.5.13. More badgers die on the roads than through any other cause, and therefore it will be necessary to assist them in crossing safely. This can be achieved by the provision of purpose-built underpasses with badger-proof fencing. Underpasses must be located on or close to existing badger paths, within the vicinity of the proposed scheme. SNH criteria, found within Scotland's Wildlife: Badgers and Development, will be followed.
  - 6.5.14. A pre-construction survey for badger activity within the survey area must be conducted, to establish the badger activity as a result of the artificial sett and the destruction of the old sett.
  - 6.5.15. Noisy machinery working within the vicinity of a known badger sett should cease at least two hours prior to sunset.
  - 6.5.16. Any artificial lighting used on site during the works should be sympathetic to the rural surroundings and security lighting should be directed away from setts. Hoods should be fitted directing the light only to the working area, to avoid light splaying into the surrounding areas and disturbing or confusing badgers in the area.
  - 6.5.17. Any chemicals used on site should be stored as far away from badger setts as possible in accordance with SNH criteria, found within Scotland's Wildlife: Badgers and Development.
  - 6.5.18. Trenches and open ditches must be covered at the end of each working day, and in case a badger does fall in, a means of escape must be included.
  - 6.5.19. Best practice techniques, outlined within BS5228: Code of practice for noise and vibration control on construction and open sites, should be carried out to minimise noise and vibration during the works which would disturb the local wildlife.
  - 6.5.20. Information on the badger tunnel locations and associated fencing is noted on Drawing No. 25000182/ENV/6.2, although locations are not shown given the protected nature of the species.

*Bat*

- 6.5.21. Pre-construction surveys must be undertaken to ensure no new wildlife has moved to the site following the 2012 / 2013 surveys. Further mitigation may be required depending on the outcome of these surveys.
- 6.5.22. Although not bat roosts were identified during previous surveys, new roosts may be present within the surveyed trees and prior to felling, further bat activity and emergence surveys will be required. If any roost is discovered, further consultation will be required with SNH and a Protected Species Licence will need to be obtained.
- 6.5.23. If a bat or bat roost is discovered during the works, works must stop and advice from a licenced bat ecologist and SNH must be sought.
- 6.5.24. Any artificial lighting used on site during the works should be sympathetic to the rural surroundings. Hoods should be fitted directing the light only to the working area, to avoid light splaying into the surrounding areas and disturbing or confusing bats in the area.

*Otter*

- 6.5.25. Any new culverts should have a specially designed ledge, built into the side, which is above the maximum flooding depth. The ledge must be accessible from both the water and the bank.
- 6.5.26. Dry tunnels may be used as an alternative to the specially designed culverts. These are often installed as general wildlife mitigation, but designed with the intention of use by otters.
- 6.5.27. Otter tunnel/ledge specification:
- For crossings between 20m and 50m, a 75cm diameter pipe should be put in place.
  - A ledge 45-60cm wide, 15cm above the highest flood level giving a minimum headroom of 60cm.
  - Ledge to be provided with split ramps at each end such that the ledge is accessible both from the water and the bank.
  - The surface of the ramps to be roughened to enhance otter grip.
  - Free air flow is vital to allow scent to be easily carried through the structure, encouraging otters to utilise the structure.
- 6.5.28. Information on the otter tunnel locations and associated fencing can be found within Drawing No. 25000182/ENV/6.2.

*Water vole*

- 6.5.29. Pre-construction surveys must be undertaken to ensure no water vole have moved into the site following the 2012 / 2013 surveys where no water vole were discovered. Mitigation may be required depending on the outcome of these surveys.

**Post Construction**

Designated Sites

- 6.5.30. No mitigation required.

Habitats

- 6.5.31. Replacement planting of trees and hedgerows using native and local species will be carried out to replace those which will be lost.
- 6.5.32. Where possible, areas of land utilised during construction, but no longer needed as part of the road scheme should be returned to their original state.
- 6.5.33. Grass verges will be sown with wildflower seeds, to maximise potential for invertebrates and birds.
- 6.5.34. More information on habitat creation can be found within Chapter 7: Landscape Effects.

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Birds

- 6.5.35. Landscape planting will be undertaken around the boundary of the proposed scheme. This will compensate for the loss of breeding and foraging habitats for bird species. Tree and hedge species must be native and of local provenance.
- 6.5.36. New vegetation will be planted a certain distance from the road, providing a wide verge which lowers the risk of bird casualties.
- 6.5.37. Areas of rough grassland with a thick litter layer will be created to encourage small mammals to provide a rich foraging habitat for barn owls. Given the nature of the surrounding land use, agricultural cereal field margins will benefit certain bird species, as well as supporting invertebrate life.
- 6.5.38. Mitigation for bird species such as barn owl should focus on improving the safety for barn owls hunting on road verges rather than deterring them. For example, forcing them to fly higher over the road by planting hedgerows or trees close to the road.
- 6.5.39. More information on planting can be found within Chapter 7: Landscape Effects.

Fish and Aquatic Invertebrates

- 6.5.40. Post construction surveys should be carried out to assess the impact of the scheme on the water quality and how it may have affected fish and aquatic invertebrate populations.

Mammals

*Badger*

- 6.5.41. Post construction surveys should be undertaken to assess the suitability and usage of the artificial sett, tunnel and associated fencing.
- 6.5.42. It is considered that the mitigation identified during construction, along with any other mitigation identified by SNH will be suitable mitigation post construction of the proposed scheme.

*Bat*

- 6.5.43. To mitigate the potential loss of bat roosts, the provision of new artificial roost sites, i.e. bat boxes should be included within the vicinity of any lost roosts.
- 6.5.44. New flight paths will be created through the planting of hedgerows to mitigate the removal of previous hedgerows.

*Otter*

- 6.5.45. Post construction surveys should be undertaken to assess the suitability and usage of otter tunnels/dry culverts. If they do not show signs that they are in use, these might need redesigned.
- 6.5.46. It is considered that the mitigation identified during construction, along with any other mitigation identified by SNH will be suitable mitigation post construction of the proposed scheme.

*Water vole*

- 6.5.47. No mitigation required.

## **6.6. Residual Impacts**

### **During Construction**

#### Designated Sites

- 6.6.1. The residual impact on designated sites during construction will remain unchanged as no mitigation is proposed.

#### Habitats

- 6.6.2. The impact on habitats remains assessed as minor, with the retention of as much of the existing habitat as possible, as a large amount of habitat will still be lost to the proposed scheme.

- 6.6.3. With the retention of as much of the existing habitat as possible, a large amount of habitat will still be lost to the proposed. The residual impact on habitats during construction, with mitigation in place is assessed as minor; therefore the significance is assessed as slight.

#### Birds

- 6.6.4. With vegetation clearances taking place outwith the bird breeding season, the impact on bird populations should be minimal. However, the construction activities will occur year round and noisy works may deter winter and breeding birds. The impact on birds, with mitigation in place during construction is assessed as minor; therefore the significance is assessed as moderate.

#### Fish and Aquatic Invertebrates

- 6.6.5. With measures to prevent spawning fish and their eggs from disturbance during construction, the residual effect should be reduced to minor; therefore the significance is assessed as moderate.
- 6.6.6. Pollution prevention during construction will alleviate the impact upon aquatic invertebrates during construction to minor; therefore the significance is assessed as slight.

#### Mammals

##### *Badger*

- 6.6.7. With the mitigation measures in place in conjunction with SNH's approval, the residual impact on badgers will be reduced from major to minor. Although a new sett will be created, the existing sett and habitat will be destroyed; hence the impact remains assessed as minor, therefore the significance is assessed as moderate.

##### *Bat*

- 6.6.8. No bat roosts were discovered on site, therefore with mitigation implemented during construction, the associated impact is assessed as negligible; therefore the significance is assessed as neutral.



*Otter*

6.6.9. With mitigation in place during construction, the impact upon otter will be reduced to minor, therefore the significance is assessed as moderate.

*Water vole*

6.6.10. The residual impact on water vole will remain unchanged as limited mitigation is proposed given the lack of activity observed; therefore the significance is assessed as neutral.

Table 6.3 Summary of Impact Assessment During Construction with Mitigation			
Receptor	Sensitivity	Magnitude	Significance
Designated Sites	Negligible	No change	Neutral
Habitats	Low	Minor	Slight
Birds	High	Minor	Moderate
Fish	High	Minor	Moderate
Aquatic Invertebrates	Medium	Minor	Slight
Badger	High	Minor	Moderate
Bat	Medium	Negligible	Neutral
Otter	Very high	Minor	Moderate
Water Vole	Negligible	No change	Neutral

**Post Construction**

Designated Sites

6.6.11. The residual impact on designated sites post construction will remain unchanged as no mitigation is proposed.

Habitats

6.6.12. With the creation of new habitats and landscaped planting, the impact on habitats post construction is assessed as minor beneficial as purpose built habitats will be created, as described within Chapter 7: Landscape Effects, enhancing the biodiversity.

Birds

6.6.13. The re-establishment of trees and hedgerows is considered to be a positive long-term impact for birds. Not all existing trees and hedgerows will be removed within the scheme therefore only some re-establishment is required. The impact on birds with mitigation post construction is assessed as minor beneficial.

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Fish and Aquatic Invertebrates

- 6.6.14. The mitigation measures in place to prevent spawning fish and their eggs from disturbance during construction will be sufficient as mitigation for post construction, therefore the impact is assessed as minor and the significance is assessed as moderate.
- 6.6.15. The mitigation measures in place to alleviate the impact upon aquatic invertebrates during construction will be sufficient as mitigation for post construction, therefore the impact is minor and the significance is assessed as slight.

Mammals

*Badger*

- 6.6.16. Badger may still fall victim to road traffic, even with mitigation in place, due to the potential for them to attempt to find alternative crossing points away from the areas of mitigation. The impact is therefore assessed as a negative.
- 6.6.17. The existing badger territory is already severed by the railway and the existing A77 with no mitigation and therefore, with mitigation in place post construction, the residual impact on badgers is assessed as minor.

*Bat*

- 6.6.18. With post construction mitigation in place, the impact on bats is assessed as moderate beneficial. Artificial roosts are likely to be more suitable than cracks and crevasses within trees as they are purpose built to suit bats needs.

*Otter*

- 6.6.19. As otter are active on a number of the watercourses within the scheme extents, they should be provided with safe routes to cross the road and along with all other mitigation, the impact is assessed as moderate beneficial.

*Water vole*

- 6.6.20. The residual impact on water vole will remain unchanged as limited mitigation is proposed.

Table 6.4 Summary of Impact Assessment Post Construction with Mitigation			
Receptor	Sensitivity	Magnitude	Significance
Designated Sites	Negligible	No change	Neutral
Habitats	Low	Minor beneficial	Slight beneficial
Birds	High	Minor beneficial	Moderate beneficial
Fish	High	Minor	Moderate
Aquatic Invertebrates	Medium	Minor	Slight
Badger	High	Minor	Moderate
Bat	Medium	Moderate beneficial	Moderate beneficial
Otter	Very high	Moderate beneficial	Large beneficial
Water Vole	Negligible	No change	Neutral

**6.7. Conclusions**

- 6.7.1. Through various surveys, numerous protected and important species have been found to be present within the survey area of the proposed scheme. The proposed scheme will result in the loss of important habitats for bird species and will result in the complete loss of one outlier badger sett.
- 6.7.2. Through a range of mitigation provided, including compensatory planting of native species, the negative impact upon habitat can be reduced and habitat may be improved. Grass verges will be sown with wildflower seeds, an improvement from only grass. These will maximise potential for invertebrates, and in turn birds and mammals.
- 6.7.3. The impact on badger can never be fully mitigated, as a sett will be lost. A licence will be required from SNH to allow the closure of this sett. However, a large amount of compensatory measures, including the building of an artificial sett, provision of tunnels under the proposed scheme and mammal-proof fencing will be carried out to reduce impact as far as reasonably practicable.