

10 Ecology and Nature Conservation

This chapter assesses the potential impact of the proposed scheme on terrestrial and freshwater species and habitats. This ecological impact assessment is presented in context of the dualling of the existing A9 and was carried out in accordance with all relevant legislation and guidelines. The approach is based on DMRB and the Institute of Ecology and Environmental Management (IEEM) guidance.

Arable land and other types of farmland comprise the majority habitat types within the ecology study area together with smaller areas of semi-natural habitats represented by wetland, grassland, woodland and freshwater habitats. Some of these are valuable habitat supporting protected species including bats, breeding birds, red squirrels, otters and water voles.

There are three sites designated for nature conservation in the vicinity of the proposed scheme; the River Tay Special Area of Conservation (SAC), Cairnleith Moss Site of Special Scientific Interest (SSSI), and Mill Dam SSSI. The Ordie Burn, Shochie Burn and Garry Burn are tributaries of the River Tay included in the SAC designation. The Ordie and the Shochie are crossed by the existing A9, and the Garry Burn runs alongside to the south of Bankfoot.

Potential impacts will be mitigated through the application of best practice guidance for construction and operation together with specific measures such as provision of bat boxes, creation/enhancement of habitats through replacement planting, and inclusion of fencing. The proposed scheme also includes embedded mitigation as part of the design such as dry mammal underpasses and overbridges.

The provision of the mitigation will ensure there are no predicted significant negative residual impacts on any terrestrial or freshwater receptors during construction or operation of the proposed scheme.

10.1 Introduction

- 10.1.1 This chapter presents an ecological impact assessment of the proposed scheme on terrestrial and freshwater species through both construction and operation of the proposed scheme.
- 10.1.2 The assessment of the proposed scheme has been undertaken in context of it being a proposal to widen and upgrade an existing road. This means that many potential impacts on ecological receptors associated with road operations, are already experienced by the species and habitats in the area. However, there are potential additional impacts which require mitigation.
- 10.1.3 Watercourses designated as part of the River Tay Special Area of Conservation (SAC), a European-designated site forming part of the Natura 2000 network, are crossed by the existing road and the proposed scheme. The assessment of the implications for the European site is presented separately in the Habitats Regulation Assessment undertaken in accordance with the requirements of the EC Habitats Directive.
- 10.1.4 This chapter is supported by the following appendices, which are cross-referenced in the text where relevant:
- Appendix A10.1 (Legislation and Conservation Status).
 - Appendix A10.2 (Detailed Terrestrial and Freshwater Ecology Methods).
 - Appendix A10.3 (Detailed Terrestrial and Freshwater Ecological Baseline Data).
 - Appendix A10.4 (Confidential – Otters).
 - Appendix A10.5 (Evaluation of Terrestrial and Freshwater Ecological Receptors).
 - Appendix A10.6 (Terrestrial and Freshwater Ecology – Impacts and Mitigation).
- 10.1.5 Appendix A10.4 (Confidential – Otters) is a confidential report not provided with the ES due to the potential risk to protected species from locational data being publicly available, but these data are submitted as a confidential report to Scottish Natural Heritage (SNH) and Transport Scotland.

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

- 10.1.6 Ecology is defined as the scientific study of the distribution and abundance of organisms and the processes that influence these and the interactions between those organisms and their environment. Nature conservation is the maintenance of viable populations of fauna and flora and the habitats and communities to which they belong.
- 10.1.7 The objectives of nature conservation are:
- maintenance of diversity and landscape character, including wildlife communities and important geological and physical features; and
 - maintenance of viable populations of native species throughout their traditional distribution range, and the improvement of the status of rare or endangered species.
- 10.1.8 The aims of this ecology assessment are to:
- identify the presence and status of habitats, flora and fauna (ecological receptors) of conservation significance within the study area through consultation, desk-based research and field surveys;
 - evaluate the importance of ecological receptors in terms of their nature conservation value;
 - identify anticipated potential impacts;
 - present potential mitigation measures to ameliorate the identified impacts; and
 - assess the residual impacts following the successful implementation of mitigation.

10.2 Approach and Methods

Overview of Approach

- 10.2.1 An assessment of terrestrial and freshwater ecology was undertaken in accordance with the requirements of DMRB Volume 11, Section 3, Part 4: Ecology and Nature Conservation (The Highways Agency et al., 1993a) and taking cognisance of other relevant guidance, such as: Scottish Transport Appraisal Guidance (STAG) (Transport Scotland, 2008); best practice guidance for ecological assessment, including the Guidelines for Ecological Impact Assessment in the United Kingdom (IEEM, 2006); and SNH guidance on EIA (SNH, 2009). It should be noted that whilst the principles of IEEM have been followed, standard impact assessment terms have been used where appropriate to provide consistency with the other assessments reported in this ES.
- 10.2.2 The following framework, provided by IEEM (2006), identifies which ecological features or resources (receptors) within the study area are both of sufficient value to be included in the assessment and vulnerable to significant impacts arising from a project:
- identification of ecological receptors;
 - identification of key attributes of the receptor;
 - identification of the level of importance of the receptor;
 - identification of legal protection offered to the receptor;
 - identification of activities in the proposal that may impact on the receptors;
 - characterisation of the potential impacts;
 - assessment of the significance of the impact to the nature conservation of the receptor;
 - assessment of the legal implications of actuating the impact;
 - outline the proposed mitigation measures; and
 - assessment of the residual impacts of the proposals.

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

- 10.2.3 The ecological impact assessment of the proposed scheme has been carried out in accordance with the above guidelines, with the following exceptions or clarifications to ensure consistency with this ES and with DMRB guidance:
- the Zone of Influence referred to in IEEM guidelines has been informed by the DMRB study area guidelines;
 - the scope was determined during consultation with SNH and SEPA, and also informed by DMRB guidance and information obtained during the general EIA consultation (Chapter 6: Consultation and Scoping) rather than the use of threshold values; and
 - the legal implications of the proposed scheme in terms of ecology and nature conservation are considered in Appendix A10.1 (Legislation and Conservation Status), and assessment of policy compliance is provided in Chapter 18 (Policies and Plans).

Consultation and Literature Review

- 10.2.4 Consultation was undertaken with statutory and non-statutory consultees with regard to ecology and nature conservation to obtain data and to identify key issues. Responses are summarised in Appendix A6.3 (Summary of Consultation Responses). The scope of the ecology assessment, which included field survey methods, was agreed through consultation with SNH.
- 10.2.5 The consultee responses were taken into account in the preparation of the ecological impact assessment. A draft copy of the ES was provided to statutory consultees including SNH in December 2013, and the finalisation of the assessment and completion of this ES chapter has been informed by comments received in January 2014 and follow-up meetings in February 2014.
- 10.2.6 Where information was provided by consultees regarding baseline conditions, it is summarised under the relevant receptor heading within the baseline section of this chapter (Section 10.3: Baseline Conditions) and provided in full within Appendix A10.3.
- 10.2.7 The UK Biodiversity Action Plan (UKBAP) (where appropriate) as set out in the Biodiversity Steering Group Report (Vol. 2; 1995), the Scottish Biodiversity List (Scottish Government, 2013) and the Tayside Local BAPs (LBAPs) and Habitat Action Plans (HAPs) were used to characterise the distribution of nationally and locally important habitats and species within the study area.
- 10.2.8 A detailed review was undertaken of relevant literature, including internet sources, to characterise species and habitats within the study area with regards to abundance, distribution and susceptibility to impacts, in particular, reference to the following was made:
- Scottish Biodiversity List (SBL), (2013).
 - Tayside Biodiversity 'The Variety of Life'. Tayside Biodiversity Partnership. (undated).
 - Strategic Transport Projects Review, Report 4, Appendix D – Environment. Report to Transport Scotland (Jacobs et al., 2007).
 - A9 Dualling Luncarty to Pass of Birnam. Stage 2 Environmental Assessment. Volume 1: Report. February 2009. Report to Transport Scotland (Atkins, 2009).

Field Surveys

Study Area

- 10.2.9 The study area for all ecological receptors typically extended to 500m from each side of the proposed scheme (i.e. a 1km wide study area) which is consistent with best practice guidance (The Highways Agency et al., 1993). This study area was agreed with SNH in a meeting in January 2013. Any variations to the study area are shown on Figure 10.1 and generally relate to the refinement of junctions or route alignment of the proposed scheme during the assessment.

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

Survey Methods

- 10.2.10 Survey methods were agreed with SNH as part of the EIA consultation process, and followed IEEM best practice guidance (IEEM, 2008). A detailed description of the survey methods used to establish baseline conditions, on which to inform a subsequent evaluation and ecological impact assessment, are presented in Appendix A10.2.
- 10.2.11 The following habitats and species surveys were undertaken:
- Extended Phase 1 habitat survey – undertaken in June and August 2013;
 - Phase 2 habitat survey – undertaken in July 2013;
 - terrestrial invertebrates – undertaken between May and August 2013;
 - bats – undertaken between March and August 2013;
 - breeding birds – undertaken in June and July 2013;
 - reptiles – undertaken between April and July 2013;
 - pine marten – undertaken in July and August 2013;
 - otter and water vole – April to August 2013;
 - great crested newt – April to June 2013;
 - aquatic habitat / river habitat – undertaken in May 2013;
 - freshwater invertebrates – undertaken in May 2013;
 - freshwater pearl mussel – undertaken in June 2013 (as part of river habitat surveys);
 - aquatic macrophytes – undertaken in July 2013;
 - ponds (Predictive Systems for Multimetrics or PSYM) – undertaken in May and July 2013; and
 - fish – redd survey undertaken in January 2013, fish survey undertaken in May 2013.
- 10.2.12 The Extended Phase 1 habitat survey included a check for presence of potentially suitable habitat and incidental field signs of a number of other protected species, to inform whether further, targeted species surveys were required. This covered the following species, for which no further species-specific surveys were required, as explained in Section 10.3 (Baseline Conditions):
- badger;
 - red squirrel;
 - wildcat; and
 - pine marten.
- 10.2.13 The presence of any existing deer fencing within the study area was also recorded during surveys.
- 10.2.14 The surveys and assessment were carried out and reviewed by experienced Jacobs ecologists, holding survey licences (these are required for certain protected species) where necessary.
- 10.2.15 Details of the legislative context for protected habitats and species are included in Appendix A10.1.
- #### **Criteria Used to Evaluate Ecological Receptors**
- 10.2.16 The following definitions are used in undertaking the evaluation of baseline conditions:
- an ecological receptor is the habitat, species or community within the receiving environment that might be influenced by the change; and

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

- the value or sensitivity of the ecological receptor refers to its importance in terms of its nature conservation value and susceptibility to impact.

10.2.17 The value or sensitivity of an ecological receptor was determined by consultation, literature review and desk-based studies, field survey information, legal protection/conservation status and professional judgement. Reference was also made to the Ratcliffe Criteria, where applicable, as used in the selection of biological Sites of Special Scientific Interest (SSSIs) (Ratcliffe, 1977).

10.2.18 A value was assigned to each ecological receptor using the framework shown in Table 10.1. The exception to this was deer. This species group was scoped out of detailed ecological assessment due to its having no conservation value. However, the receptor is discussed in this chapter in the context of potential for collisions with vehicles during the operational phase of the proposed scheme, which could result in the potential for road safety and animal welfare issues.

Table 10.1: Criteria Used to Evaluate Ecological Receptors

Importance	Attributes of Ecological Receptor
International European	Habitats <ul style="list-style-type: none"> An internationally designated site or candidate site (i.e. SPA, provisional SPA (pSPA), SAC, candidate SAC (cSAC), Ramsar site, Biogenetic/Biosphere Reserve, World Heritage Site or an area which meets the published selection criteria for such designation). A viable area of a habitat type listed in Annex I of the Habitats Directive, or smaller areas of such habitat that are essential to maintain the viability of a larger whole. Any river classified as excellent A1 (SEPA), not at significant risk– 2.a and 2.b Water Framework Directive (WFD) and known to support a substantial salmonid population. Any river with a Habitat Modification Score (HMS) indicating that it is Pristine or Semi-Natural (and within an internationally designated site). Species <ul style="list-style-type: none"> Any regularly occurring population of an internationally important species, which is threatened or rare in the UK (i.e. a UK Red List species or listed as occurring in 15 or fewer 10km squares (categories 1 & 2 in UKBAP), of uncertain conservation status or global conservation concern in UKBAP). A regularly occurring, nationally significant population/number of any internationally important species.
National Scottish	Habitats <ul style="list-style-type: none"> A nationally designated site (i.e. SSSI, National Nature Reserve (NNR), or a discrete area, which meets the published selection criteria for national designation (e.g. SSSI selection guidelines)). A viable area of a priority habitat identified in the UKBAP, or of smaller areas of such habitat that are essential to maintain the viability of a larger whole. Any pond with PSYM results in the top category for 'good' ecological quality (PSYM result $\geq 75\%$) indicative of a priority pond. Any river classified as excellent A1 (SEPA), not at significant risk– 2.a and 2.b (WFD) and likely to support a substantial salmonid population. Any river with a HMS indicating that it is Pristine or Semi-Natural. Habitat of high value based on its ecological function. LEAFPACS score indicating at least high habitat value (≥ 0.8). Species <ul style="list-style-type: none"> A regularly occurring, regionally or county significant population/number of an internationally/nationally important species. Any regularly occurring population of a nationally important species which is threatened or rare in the region or county (see LBAP). A species identified as a priority species listed in the UKBAP. A species listed on 1994 or 2001 International Union for the Conservation of Nature (IUCN) criteria as at least Near Threatened or at least Rare on the Red List based on pre-1994 IUCN guidelines; species listed as Nationally Scarce, Nationally Notable A or Notable B (rare and scarce species not based on IUCN criteria). CCI of very high conservation value (conservation score >20.00).
Regional Tayside	Habitats <ul style="list-style-type: none"> Sites which exceed the county-level designations but fall short of SSSI selection criteria. Viable areas of key habitat identified in the regional BAP or smaller areas of such habitat that are essential to maintain the viability of a larger whole. Viable areas of key habitat identified as being of regional value in the appropriate SNH Natural Heritage Future area profile.

A9 Dualling: Luncarty to Pass of Birnam
DMRB Stage 3 Environmental Statement
Chapter 10: Ecology and Nature Conservation

Importance	Attributes of Ecological Receptor
Regional <i>continued</i>	<ul style="list-style-type: none"> • Any pond with PSYM results in the top category for 'good' ecological quality (PSYM result $\geq 75\%$) • indicative of a priority pond. • Any river classified as excellent A1 or good A2 (SEPA), not at significant risk– 2.a and 2.b (WFD) and capable of supporting salmonid population. • Any river with a HMS indicating that it is 'obviously modified' or better. • Habitat of medium to high value based on its ecological function. • LEAFPACS score indicating at least high habitat value (≥ 0.8). <p>Species</p> <ul style="list-style-type: none"> • Any regularly occurring, locally significant population of a species listed as being nationally scarce which occurs in 16-100 10km squares in the UK or in a regional BAP or relevant SNH Natural Heritage Future area on account of its regional rarity or localisation. • A regularly occurring, locally significant population/number of a regionally important species. • Sites maintaining populations of internationally/nationally important species that are not threatened or rare in the region or county. • Species listed as 'indeterminate' or 'insufficiently known' on the Red Listing pre-1994 IUCN guidelines or species listed on the 1994 IUCN guidelines as data deficient or species listed on the 2001 Red Listing as 'lower risk – least concern'. • WFD classification of high based on invertebrates. • CCI of high conservation value (conservation score $\geq 15.00-20.00$).
Authority area Perth & Kinross Council	<p>Habitats</p> <ul style="list-style-type: none"> • Sites recognised by local authorities (e.g. Sites of Interest for Nature Conservation (SINC). • County/district sites that the designating Authority has determined meet the published ecological selection criteria for designation, including Local Nature Reserves (LNR). • A viable area of habitat identified in county/district BAP or in the relevant SNH Natural Heritage Future area profile. • A diverse and/or ecologically valuable hedgerow network. • Semi-natural ancient woodland greater than 0.25ha. • Any pond with PSYM results in the top category for 'good' ecological quality (PSYM result $\geq 75\%$) indicative of a priority pond. • Any river classified as good A2 or fair B (SEPA), not at significant risk– 2.a and 2.b (WFD) (and likely to support a cyprinid/coarse fishery). • Any river with a HMS indicating that it is 'significantly modified' or above. • Habitat of at least medium value. • LEAFPACS score indicating at least good habitat value (≥ 0.6). <p>Species</p> <ul style="list-style-type: none"> • Any regularly occurring, locally significant population of a species that is listed in a county/district BAP on account of its regional rarity or localisation. • A regularly occurring, locally significant population of a county/district important species (particularly during a critical phase of its life cycle). • Sites supporting populations of internationally/nationally/regionally important species that are not threatened or rare in the region or county, and not integral to maintaining those populations. • Sites/features scarce within the county/district or which appreciably enrich the county/district habitat resource. • WFD classification of high based on invertebrates. • CCI in full of fairly high conservation value (conservation score $\geq 10.00-15.00$).
Local e.g. Bankfoot	<p>Habitats</p> <ul style="list-style-type: none"> • Areas of habitat considered to appreciably enrich habitat resource e.g. species-rich hedgerows, ponds. • Sites that retain other elements of semi-natural vegetation that due to their size, quality or the wide distribution of such habitats within the local area are not considered for the above classifications. Semi-natural ancient woodland smaller than 0.25ha. • Any pond with PSYM results in the category for 'moderate' ecological quality (PSYM result 51-75%). • Any river classified as fair B or poor C (SEPA), not at significant risk– 2.a and 2.b (WFD) and unlikely to support coarse fishery. • Rivers with a HMS indicating that it is 'severely modified' or above. • Habitat of low to medium value based on its ecological function. • LEAFPACS score indicating at least good habitat value (≥ 0.6). <p>Species</p> <ul style="list-style-type: none"> • Populations/assemblages of species that appreciably enrich the local biodiversity resource.

Importance	Attributes of Ecological Receptor
Local <i>continued</i>	<ul style="list-style-type: none"> • Sites supporting populations of county/district important species that are not threatened or rare in the region or county, and are not integral to maintaining those populations. • WFD classification of good based on invertebrates. • CCI of moderate conservation value (conservation score 5.00-10.00).
Less than Local Limited ecological value	<p>Habitats</p> <ul style="list-style-type: none"> • Sites that retain habitats and/or species of limited ecological importance owing to their size, species composition or other factors. • Any pond with PSYM results in the category of less than 'poor' ecological quality (PSYM result ≤50%). • Any river classified as impoverished D (SEPA), not at significant risk– 2.a and 2.b (WFD) and/or and with a HMS indicating that it is 'severely modified'. • Habitat of low to medium value. • LEAFPACS score indicating moderate or less habitat value (<0.6). <p>Species</p> <ul style="list-style-type: none"> • WFD classification of moderate or below based on invertebrates. • CCI of low conservation value (conservation score <5.00).

Impact Assessment

Identification of Impacts

- 10.2.19 Knowledge and assessment of construction methods and operational activities, together with professional judgment by experienced ecologists has been used to identify the potential impacts of the proposed scheme on ecological receptors. The activities that could have a potential ecological impact were reviewed and assessed for each ecological receptor individually as well as the implications from cumulative effects assessed. Professional judgement by experienced ecologists was used to identify those activities associated with the proposed scheme that could impact on a particular receptor in construction and operational phases. Potential impacts that might affect an ecological receptor are summarised in Table 10.2.

Table 10.2: Potential Impacts of the Proposed Scheme

Potential Impact	Activity/Cause
Direct loss	<ul style="list-style-type: none"> • Land-take • Water pollution • Dust and air pollution • Changes to hydrology
Direct mortality	<ul style="list-style-type: none"> • Land-take • Collision with traffic • Alien species transfer • Disease transfer (e.g. red leg disease in amphibians) • Water pollution
Habitat Fragmentation	<ul style="list-style-type: none"> • Land-take • Noise and vibration • Effects of temporary construction lighting
Loss of diversity	<ul style="list-style-type: none"> • Alien species transfer (botanical)* • Dust and air pollution • Effects of road spray • Water pollution • Changes to hydrology
Disturbance	<ul style="list-style-type: none"> • Noise and vibration • Effects of temporary construction lighting • Land-take

*Alien species are those not native to UK and have an invasive nature that reduces ecological diversity of habitats (e.g. Japanese knotweed (*Fallopia japonica*), Himalayan balsam (*Impatiens glandulifera*), giant hogweed (*Heracleum mantegazzianum*)). Not to be confused with injurious weeds (Weeds Act, 1959) that are invasive, but native to UK (e.g. spear thistle (*Cirsium vulgare*), creeping or field thistle (*Cirsium arvense*), ragwort (*Senecio jacobaea*)). Examples of alien faunal species include European beaver (*Castor fiber*) and American mink (*Neovison vison*).

Impact Magnitude

- 10.2.20 For the purposes of this assessment, the term 'impact magnitude' is taken to represent the overall characterisation of positive or negative impacts in accordance with IEEM (2006), including:
- impact extent/scale;
 - direct or indirect impact;

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

- reversibility of impact;
- frequency of impact (single event, recurring or constant);
- duration of impact (short-term, medium-term, long-term or permanent); and
- likelihood of occurrence (certain/near certain, probable, unlikely or extremely unlikely).

10.2.21 Impact magnitude was identified as shown in Table 10.3 as negligible; low; medium or high, taking into account the above impact characterisation approach.

Table 10.3: Impact Characterisation Translated into Impact Magnitude

Impact Character	Magnitude
A permanent or long-term effect on the distribution and/or abundance of a habitat, species assemblage/community or population. If negative this would have implications for the integrity of the receptor and its conservation status, and if positive would result in an improvement to the conservation status of the receptor.	High
A permanent or long-term effect on the distribution and/or abundance of a habitat, species assemblage/community or population. If negative this would have negligible implications for the integrity of the receptor or its conservation status and if positive would not alter the conservation status of the receptor.	Medium
A short-term reversible effect on the distribution and/or abundance of a habitat, species assemblage/community or population and within normal fluctuations observed within the ecology of the receptor.	Low
A short-term reversible effect on the distribution and/or abundance of a habitat, species assemblage/community or population unlikely to be detectable by monitoring.	Negligible

Impact Significance

10.2.22 Once potential impacts were understood and receptor value determined, professional judgement was used to focus the assessment on impacts requiring mitigation. For example, an area of amenity grassland would be evaluated as of less than local value and would not progress through the assessment process. However, an impact on a SSSI valued at a national level would progress through the assessment process, with mitigation and residual impacts identified.

10.2.23 IEEM (2006) states that:

'if an ecological resource or feature is likely to experience a significant impact, the consequences in terms of development control, policy guidance and legislation will depend on the level at which it is valued. Significant impacts on features of ecological importance should be mitigated (or compensated for) in accordance with guidance derived from policies applied at the scale relevant to the value of the feature or resource. Any significant impacts remaining after mitigation (the residual impacts), together with an assessment of the likelihood of success in the mitigation, are the factors to be considered against legislation, policy and development control in determining the application'.

10.2.24 In accordance with IEEM (2006), a significant impact is an impact (negative or positive) on the integrity of a defined site or ecosystem and/or the conservation status of habitats and species. It is based on consultation, research and experience from other projects, professional judgment and the available information on the impact and receptor. In the context of reporting in this chapter, the specific impact tables provided in Section 10.4 (Potential Impacts) contain information regarding all potential impacts considered to be significant.

10.2.25 Taken together the above information is applied to a matrix to determine the significance of an impact (Table 10.4). Impacts can be positive or negative, either decreasing or improving the health, ecological status or viability of a population, species or habitat.

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

Table 10.4: Impact Significance

Magnitude \ Importance	High Negative	Medium Negative	Low Negative	Negligible	Low Positive	Medium Positive	High Positive
International	Major	Major	Moderate	Negligible	Moderate	Major	Major
National	Major	Major	Moderate	Negligible	Moderate	Major	Major
Regional	Major	Moderate	Minor	Negligible	Minor	Moderate	Moderate
Authority area	Moderate	Moderate	Minor	Negligible	Minor	Moderate	Moderate
Local	Minor	Minor	Minor	Negligible	Minor	Minor	Minor
Less than Local	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

- 10.2.26 The impact significance terms are explained below (Table 10.5) and take cognisance of DMRB, IEEM (2006) and SNH (2009) guidance.

Table 10.5 Description of Significance Categories

Significance Category	Typical Description
Major	Associated with receptors of international, national or regional importance. Likely to be a damaging impact or loss of resource integrity. Effects likely to be permanent and irreversible resulting in a loss of structure and/or function. If beneficial, they will have a significant positive effect on the international or national receptor.
Moderate	Associated with receptors of international, national, regional or authority area importance. Likely to be a damaging impact or loss of resource integrity. However, the impact character is less substantive due to, for example, their extent, duration, reversibility, timing and/or degree of certainty. If beneficial, they will have a significant positive effect on the international or national receptor.
Minor	Associated with receptors of regional, authority area, local or less than local importance. Likely to be a damaging impact or loss of resource integrity. However, the impact character is less substantive due to, for example, their extent, duration, reversibility, timing and/or degree of certainty. If beneficial, they will have a significant positive effect on the international or national receptor.
Negligible	No effects or those that are beneath the levels of perception. Effects may also be within the normal bounds of variation for a receptor.

Mitigation and Residual Impacts

- 10.2.27 In general, a hierarchical approach to mitigation has been adopted for the proposed scheme, which seeks to avoid adverse impacts in the first instance through an iterative approach to design (e.g. informing road alignment to avoid sensitive receptors where possible). In areas where avoidance is not possible, measures are proposed to prevent or reduce potentially significant negative impacts. Measures to compensate the negative impacts at specific sites may also be required (e.g. habitat creation to offset the local, site-specific impacts associated with habitat loss and fragmentation).
- 10.2.28 Mitigation was identified to meet the requirements outlined in the Environmental Impact Assessment (Scotland) Regulations 1999 (as amended) which require 'a description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment' to be provided (Scottish Government, 2007).
- 10.2.29 Any significant impacts that may remain after implementation of proposed mitigation are reported in Section 10.6 (Residual Impacts). Potentially significant impacts which are avoided, reduced to not significant, or are offset, are reported in detail in Appendix A10.6 (Terrestrial and Freshwater Ecology – Impacts and Mitigation).

Limitations to Assessment

- 10.2.30 Changes to the proposed scheme during the Stage 3 process resulted in small alterations to the study area. These changes were reviewed and some update habitat surveys were undertaken. Some potentially suitable GCN and bat habitat was not subject to specific presence / absence surveys undertaken as there are seasonal constraints for doing these surveys, however habitat

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

suitability surveys for these species were undertaken and this is considered to be sufficiently robust for the purposes of assessment.

10.3 Baseline Conditions

10.3.1 The baseline conditions described in this section have been determined through a combination of desk-study, review of historical biological data sources, consultation and through field surveys.

A9 Dualling: Strategic Environmental Assessment (SEA)

10.3.2 As noted in Chapter 2 (Need for the Scheme), a SEA of the wider programme of proposed dualling of the A9 from Perth to Inverness has also been undertaken. The outcomes of the SEA, including strategic considerations in terms of 'biodiversity, flora & fauna', and responses from consultees, have been reviewed as part of this assessment.

10.3.3 Alongside the SEA, a programme-level Habitat Regulations Assessment (HRA) of the A9 dualling programme has been undertaken (Halcrow, 2013a; 2013b). This informed the HRA for the River Tay SAC completed in relation to the EIA for the proposed scheme (Jacobs, 2014).

River Tay SAC - Habitat Regulations Appraisal (HRA)

10.3.4 A HRA (Jacobs, 2014) of the implications of the proposed scheme on the conservation objectives and the integrity of the River Tay SAC has been undertaken in parallel with the ES. Likely significant effects are related to water quality, disturbance, severance/fragmentation and land-take.

10.3.5 Through consultation with SNH it was confirmed that the minimal SAC land-take as a result of culvert extensions was a *de minimis* implication on the integrity of the SAC. This was recorded as a minor residual effect in the HRA and taken forward for further evaluation in the in-combination assessment. SNH also confirmed that, in principle, the two levels of treatment proposed for road drainage (as agreed with SEPA) would be acceptable depending on the outcome of the pollution risk assessment.

10.3.6 A brief summary of the likely significant impacts on the SAC is provided in Section 10.4 (Potential Impacts). The HRA concludes that with the proposed mitigation there would be no adverse effects on the conservation objectives or integrity of the River Tay SAC. The HRA report will inform an Appropriate Assessment to be made by the Scottish Government as the competent authority, in accordance with the requirements of the Habitats Directive and as informed by statutory advice from SNH.

Habitats and Vegetation

Designated Sites

10.3.7 Designated nature conservation sites are illustrated on Figure 10.1 and described below. There are three designated sites within the study area:

- The River Tay SAC;
- Cairnleith Moss SSSI; and
- Mill Dam SSSI.

River Tay SAC

10.3.8 The River Tay SAC (site code UK0030312, SNH site code 8366) has six qualifying interests:

- one Annex I habitat, Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea*; and

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

- five Annex II species, European otter (*Lutra lutra*), Atlantic salmon (*Salmo salar*), brook lamprey (*Lampetra planeri*), river lamprey (*L. fluviatilis*), sea lamprey (*Petromyzon marinus*).

10.3.9 Atlantic salmon is the primary reason for the selection of the site, all other habitats and species are present as a qualifying feature, but not primary reasons for selection (Joint Nature Conservation Committee; JNCC, 2013a). All qualifying interests have been assessed as being in a Favourable Maintained condition (SNH, 2013a).

10.3.10 As explained in paragraph 10.3.4 above, a HRA has been undertaken to determine likely significant effect and assess any adverse impacts on the integrity of the site.

Cairnleith Moss SSSI

10.3.11 Cairnleith Moss SSSI (SNH site code 289) lies 1km northeast of Bankfoot, to the east of the A9. It covers an area of 80.66ha and is cited for its biological (wetland) features; laggs of raised bog and spring fen. These two features are classed as Favourable Maintained (21/07/2008) (SNH, 2013b).

10.3.12 The site is a complex mosaic of wet heath, swamp, open water, scrub and acid grassland communities and there are very few such large areas of unimproved wetland and heath areas remaining in lowland Perth & Kinross authority area (SNH, 2007). It is also the only site in lowland east Perth and Kinross selected for its flush grassland communities.

10.3.13 Perth & Kinross Council provided a National Vegetation Classification (NVC) map of the SSSI. This indicated that within the study area, the main vegetation types were gorse (*Ulex europaeus*) scrub, wet heath, rush-pasture and acid grassland, with an area of tall-herb fen (swamp vegetation).

Mill Dam SSSI

10.3.14 The Mill Dam SSSI (SNH site code 1153) lies at the northern end of the proposed scheme approximately 1km west of Kingswood. It covers an area of 8.83ha and is cited for its biological (wetland) feature: basin mire. The site consists of a small area of open water which was artificially impounded by an earth dam and sluice to serve the mills at Murthly.

10.3.15 The most important features are the small area of fen influenced by ground water on the west side of the dam, and the surrounding reed-swamp, which contains the uncommon lesser tussock sedge (*Carex diandra*), and bog sedge (*Carex limosa*), and the locally rare many-stalked spike rush (*Eleocharis multicaulis*). Interrupted clubmoss (*Lycopodium annotinum*) is a nationally scarce species and is present in its only known lowland site in the Perth & Kinross area (SNH, 2010a).

10.3.16 Site condition monitoring in 2003 showed the site to be in a favourable condition (SNH, 2010b). Further monitoring in 2010 showed that the site was in an unfavourable declining condition (SNH, 2013c). The site appears to be at risk from nutrient enrichment (from slurry spreading on adjacent land), unconsented drainage, and silt and vegetation encroachment (SNH, 2010b).

Biodiversity Action Plan and Scottish Biodiversity List

10.3.17 Habitats and species within Perth & Kinross local authority area are covered by the Tayside LBAP. The action plan is divided into six sub-groups covering:

- Coasts and Estuaries.
- Farmland.
- Upland.
- Urban and Built Environment.
- Water and Wetland.
- Woodland.

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

- 10.3.18 The LBAP includes habitat descriptions and lists of key species for a number of habitats pertinent to the study area, as listed in Table 10.6.

Table 10.6: Habitats and Key Species Groups in Tayside LBAP Potentially Present within Study Area

Habitat Sub-Group	Habitat Type	Key Species
Farmland	Calcareous & Base-rich grassland	Birds, invertebrates, molluscs, plants, fungi
	Farm buildings	Mammals, birds
	Hedgerows & Treelines	Mammals, birds, invertebrates, plants
	Stone Dykes	Mammals, birds, amphibians, reptiles, invertebrates, plants
	Wet Grassland	Mammals, birds, amphibians, reptiles, invertebrates, plants
Urban & Built Environment	Built & Development Environment	Mammals, birds, amphibians, reptiles, fish, invertebrates, plants
	Businesses with land	Mammals, birds, amphibians, reptiles, invertebrates, plants
Water & Wetlands	Mesotrophic Lochs	Mammals, birds, amphibians, plants
	Rivers & Burns	Mammals, birds, fish, invertebrates, plants
	Standing Open Water	Mammals, birds, amphibians, fish, invertebrates, plants
Woodland	Native Pinewoods	Mammals, birds, invertebrates, higher plants, fungi, lichens

- 10.3.19 In addition, proposed HAPs and Species Action Plans (SAPs) have been developed for 12 habitats and ten animal species (amphibians, birds, fish and mammals). No SAPs have been proposed for invertebrates or plants.
- 10.3.20 The Scottish Biodiversity List (Scottish Government, 2013) contains 41 habitats across five broad types - coastal, freshwater and wetland, lowland, woodland, and upland - of which 27 are assessed as requiring conservation action. Of the 41 habitats on the list it was considered that 19 had the potential to occur within the study area (Appendix A10.3).

Ancient Woodland Inventory

- 10.3.21 Ancient Woodland Inventory (AWI) areas are illustrated on Figure 1.2 and described below.

Phase 1 Habitat Survey

- 10.3.22 Phase 1 habitat survey results are illustrated on Figure 10.2 and summarised below.
- 10.3.23 One area classed as Ancient Woodland (listed on the AWI as category 1a or 2a) is recorded as present within the study area, Byres Wood (Target note 34). Four areas of Long-established Woodland of Plantation Origin are recorded within the study area:
- woodland near Tophead;
 - Five-mile Wood;
 - Gelly Wood; and
 - woodland near Kingswood at the northern end of the study area.
- 10.3.24 Gelly Wood comprises a number of different parcels of woodland on both sides of the proposed scheme. Within the study area, five of these parcels are also listed on the Semi Natural Ancient Woodland Inventory.
- 10.3.25 A Phase 1 habitat survey of the study area was undertaken during June and July 2013. Phase 2 surveys of habitats and/or areas of conservation interest were undertaken in July 2013. These surveys included NVC assessments.
- 10.3.26 Arable land comprised over 52% of the study area, woodlands and scrub accounted for 20% and grassland (not including marshy grassland) 18%. Coniferous plantation woodland was the largest

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

woodland component (12%) whilst improved grassland was the largest grassland component (15%). Heathland and bog habitats accounted for 4% of the study area and wetland habitat 4%.

- 10.3.27 In the south of the study area, the majority of land-use comprises agricultural land, mainly arable, improved or poor semi-improved grassland. To the north of the site, north of Bankfoot, woodland is the predominant type. This includes mature coniferous and broad-leaved plantation woodland, recently planted plantation and felled woodland. In addition, some areas categorised as long-established plantation in woodland inventories have been classed as semi-natural woodland due to the amount of natural regeneration and habitat reversion.
- 10.3.28 Other habitats present include marshy grassland and other wetland communities, mainly at Cairnleith Moss SSSI, the Muir of Thorn area and within the plantation woodland areas. Outwith the Cairnleith Moss SSSI, bog and heath communities were mainly associated with the plantation woodland and were generally highly modified and/or degraded.
- 10.3.29 Greater butterfly-orchid (*Platanthera chlorantha*), a SBL species and classed as “near threatened” (Cheffings & Farrell et al., 2005) was recorded by the Garry Burn in Bankfoot. Lesser butterfly-orchid (*P. bifolia*), also a SBL species and classed as “vulnerable” (Cheffings & Farrell et al., 2005) was recorded within and adjacent to the Cairnleith Moss SSSI.
- 10.3.30 Non-native species were recorded at a number of locations, although only two species were of an invasive nature: rhododendron (*Rhododendron ponticum*) and Himalayan balsam (*Impatiens glandulifera*). Rhododendron was associated with woodlands in the Gelly area whilst Himalayan balsam was present on all the main watercourses (Shochie Burn, Ordie Burn, Garry Burn).

Phase 2 Habitat Survey

- 10.3.31 The Phase 2 habitat survey of those parts of Cairnleith Moss SSSI within the study area indicated that, in general, the NVC community information provided by Perth & Kinross Council was accurate except for the gorse scrub vegetation. This community (W23 *Ulex europaeus-Rubus fruticosus* scrub) was no longer extensive within the study area and was mainly reduced to a few scattered plants suggesting that scrub clearance had taken place. The vegetation had been replaced in some areas by a mixture of M15 *Trichophorum cespitosum-Erica tetralix* wet heath, M23 *Juncus effusus/acutiflorus-Galium palustre* rush-pasture and M25 *Molinia caerulea-Potentilla erecta* mire. Elsewhere downy birch dominated (*Betula pubescens*) woodland had taken over (W4 *Betula pubescens-Molinia caerulea* woodland).
- 10.3.32 Parts of the previously mapped M15 wet heath vegetation appeared to have become more dominated by purple moor-grass (*Molinia caerulea*) which can occur as a result of a reduction in grazing. This vegetation was more characteristic of M25 mire.
- 10.3.33 Outwith the large area of M23 rush-pasture, the vegetation was more variable at the small scale than the Perth & Kinross Council map indicated. The vegetation showed localised transitions between the main community types, with other related grassland, mire or wet heath communities or sub-communities present depending on the recording scale.

Terrestrial Invertebrates

- 10.3.34 One record of a terrestrial invertebrate, a mason bee species (*Osmia* sp.), was found during a search of the National Biodiversity Network’s (NBN) gateway (NBN, 2013). No records were reported in the DMRB Stage 2 assessment (Atkins, 2009). Field surveys indicated a potential for the presence of terrestrial invertebrates in all habitat types assessed. Within the study area twelve land parcels, representative of the different types of habitats found in the study area, were identified (Figure 10.3). These twelve land parcels were assessed for invertebrate habitat potential and all but one was assessed as having moderate potential. Land parcel 4 (Five Mile Wood) was determined to have low potential. In addition, all cultivated land was assessed collectively and this was also determined to have low potential.

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

10.3.35 Incidental records of invertebrates showed that the SBL species small pearl-bordered fritillary (*Boloria selene*) was present in land parcels 6 and 9 (Cairnleith Moss SSSI and Gelly Woods), whilst LBAP species (orange tip butterfly (*Anthocharis cardamines*), peacock butterfly (*Inachis io*) and common blue damselfly (*Enallagma cyathigerum*)) were recorded in parcels 1, 8, 9 and 11 (Shochie Burn, Muir of Thorn (south), Gelly Woods and Mill Dam SSSI).

Bats

10.3.36 Detailed baseline information is presented in Appendix A10.3 (Section 4: Bats) and summarised below.

10.3.37 The Bat Conservation Trust (BTC) noted that the habitat, woodland and water provide good feeding habitat and advised that they considered bats to be present in the area. Tayside Bat Group confirmed that bats were recorded in the Luncarty to Birnam area, mainly near the river, and also in Luncarty and Bankfoot. Tayside Bat Group also confirmed the presence of a large maternity colony of pipistrelles north of Perth but outside the study area.

10.3.38 Desk based research produced historic records of common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*P. pygmaeus*) and brown long-eared bat (*Plecotus auritus*) from within the study area. During the DMRB Stage 2 assessment (Atkins, 2009), Daubenton's (*Myotis daubentonii*), Natterer's (*Myotis nattereri*), brown long-eared, common and soprano pipistrelle, as well as a vesper bat species (*Vespertilionidae*) were recorded.

10.3.39 Habitat assessments and tree and building roost assessments were completed between March and August 2013. These surveys identified multiple trees, buildings and bridges along the A9 suitable for roosting bats, as well as areas suitable for foraging and commuting bats (Figure 10.4).

10.3.40 A total of 183 trees (or groups of trees) were assessed for their potential to support roosting bats, 24 of which were classified as Category 1* trees capable of supporting large roosts (Bat Conservation Trust, 2012) (Figure 10.5).

10.3.41 Thirteen properties and four bridges were identified from external visual inspections as having moderate to high potential to support roosting bats, and emergence/re-entry surveys were consequently carried out between May 2013 and July 2013.

10.3.42 Bat roosts were identified at nine of the surveyed properties (Figure 10.5). The largest estimated roost size was recorded at Broompark Farm with seven bats seen emerging from the property. Estimated roost sizes of between ten and 14 *Myotis sp.* bats were recorded at Ordie and Shochie railway bridges. Common and soprano pipistrelles were the most numerous species during activity surveys although brown long-eared and Daubenton's bats were also recorded.

10.3.43 Bat activity transects (Figure 10.4) were conducted between June 2013 and July 2013. The highest level of bat activity was recorded in the Newmill area, but moderate bat activity was recorded during all six transects. Common and soprano pipistrelle activity were the only species recorded during activity transects.

10.3.44 A total of five potential bat commuting routes were surveyed using static detectors between June and July 2013. Common and/or soprano pipistrelle commuting activity was recorded at all five recording points with high activity noted at all locations with the exception of Bankfoot where activity was low. A Nathusius pipistrelle (*Pipistrellus nathusii*), was recorded at Bankfoot, Cairnleith Wood and Gelly Wood, although activity was noted as low. Low levels of *Myotis sp.* commuting activity was recorded at all five locations and brown long-eared bats were also recorded at Cairnleith Wood and Gelly Wood.

Badger

10.3.45 A desk study and field evaluation undertaken during the extended Phase 1 habitat survey did not provide any evidence of badger (*Meles meles*) activity within the study area. No signs of badger

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

were recorded during the DMRB Stage 2 assessments and no information on badgers has been received as part of the consultation. It is considered unlikely that badgers are present, and this species was therefore scoped out of further assessment.

Breeding Birds

- 10.3.46 A total of 58 incidental bird records were gathered during the DMRB Stage 2 extended Phase 1 habitat surveys in 2008 (Atkins, 2009). Of the species recorded two are WCA1i species (barn owl (*Tyto alba*) and quail (*Coturnix coturnix*)). A data search on NBN Gateway (NBN, 2013) produced a list of 55 species of breeding birds within the survey area. Of the species recorded four are WCA1i species (barn owl, hen harrier (*Circus cyaneus*), merlin (*Falco columbarius*) and osprey (*Pandion haliaetus*)).
- 10.3.47 Twenty species were recorded as incidentals during ecological surveys between March and June 2013. Of the species recorded three are WCA1i species (barn owl, kingfisher (*Alcedo atthis*) and osprey).
- 10.3.48 The Tayside LBAP contains 50 species that could potentially be found breeding in the survey area, based on habitats present. Of these species, five are WCA1i listed species (barn owl, goshawk (*Accipiter gentiles*), kingfisher, merlin and osprey).
- 10.3.49 Detailed baseline data for breeding birds is presented in Appendix A10.3 (Section 6: Breeding Birds) and summarised below.
- Six quadrats were surveyed for breeding birds within the survey area and a total of 49 breeding bird species were recorded although no WCA1i species were recorded; eight were JNCC red listed species: linnet (*Carduelis cannabina*), skylark (*Alauda arvensis*), song thrush (*Turdus philomelos*), spotted flycatcher (*Muscicapa striata*), starling (*Sturnus vulgaris*), house sparrow (*Passer domesticus*), tree sparrow (*Passer montanus*) and yellowhammer (*Emberiza citrinella*).
 - Twelve were JNCC amber listed species: bullfinch (*Pyrrhula pyrrhula*), common whitethroat (*Sylvia communis*), curlew (*Numenius arquata*), dunnoek (*Prunella modularis*), house martin (*Delichon urbica*), meadow pipit (*Anthus pratensis*), mistle thrush (*Turdus vicivorus*), oystercatcher (*Haematopus ostralegus*), reed bunting (*Emberiza schoeniclus*), swallow (*Sturnus vulgaris*), willow warbler (*Phylloscopus trochilus*) and whinchat (*Saxicola rubetra*).
 - Thirteen were listed on the SBL: bullfinch, curlew, dunnoek, linnet, reed bunting, siskin (*Carduelis spinus*), skylark, song thrush, spotted flycatcher, starling, house sparrow, tree sparrow and yellowhammer.
 - Twenty-six were listed on the LBAP: blackbird (*Turdus merula*), blue tit (*Cyanistes caeruleus*), bullfinch, chaffinch (*Fringilla coelebs*), curlew, dunnoek, goldfinch (*Carduelis carduelis*), great spotted woodpecker (*Dendrocopus major*), great tit (*Parus major*), greenfinch (*Carduelis chloris*), house martin, house sparrow, linnet, reed bunting, robin (*Erithacus rubecula*), skylark, song thrush, sparrowhawk (*Accipiter nisus*) spotted flycatcher, starling, swallow, tawny owl (*Strix aluco*), tree sparrow, whinchat, wren (*Troglodytes troglodytes*) and yellowhammer.

Reptiles

- 10.3.50 Detailed baseline information is presented in Appendix A10.3 (Section 7: Reptiles) and summarised below.
- 10.3.51 A search of NBN produced one record of common lizard (*Zootoca vivipara*) and no records of adders (*Vipera berus*) or slow worms (*Anguis fragilis*) from within the study area. The Stage 2 Environmental Assessment produced an additional common lizard record and also obtained records of slow worms from the area. No information on reptiles has been received as part of the consultation.

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

10.3.52 Six sites were identified as having potential to support reptile populations following on-site habitat assessments. Field surveys at these locations started in March 2013 and continued until July 2013 (Figure 10.7).

10.3.53 A total of 15 common lizards were found between four of the six sites surveyed. No evidence of adders or slow worms was found.

Pine Marten

10.3.54 Desk based research produced no pine marten (*Martes martes*) records, but one record was documented in the DMRB Stage 2 assessment (Atkins, 2009). A recent survey of pine marten expansion in Scotland conducted by SNH and the Vincent wildlife Trust (VWT) confirmed the presence of the species in Perthshire (Croose et al., 2013). No information relating to pine martens has been received as part of the consultation.

10.3.55 A habitat suitability assessment for pine marten was undertaken in July 2013. The assessment identified an area in the northern-most 1.5km of the study area as being potentially suitable for pine marten. A walkover survey of habitat identified as suitable for pine marten was undertaken during the extended Phase 1 habitat survey. No confirmed evidence of pine marten was located during the walkover survey.

10.3.56 Due to the habitat suitability, incidental records and a record from the DMRB Stage 2 surveys as shown on Figure 10.8 (Atkins, 2009), it is assumed that pine marten are present within Muir of Thorn and Gelly Wood. This is further supported by the pine marten expansion survey which shows the Scottish pine marten population (excluding the Dumfries and Galloway population) to have expanded as far south as the central belt (Croose et al., 2013).

Red Squirrel

10.3.57 Red squirrel (*Sciurus vulgaris*) baseline information is presented in Appendix A10.3 (Section 9: Red Squirrel) and summarised below. Information received from the A9 SEA team indicated the presence of grey squirrel near Luncarty (NO 092 296).

10.3.58 In addition to the red squirrel sighting documented in the DMRB Stage 2 assessment, there are also records of red squirrels from the Muir of Thorn and Bankfoot (Atkins, 2009). Surveys by the Saving Scotland's Red Squirrel (SSRS) project in 2012 also identified the presence of both red and grey squirrel along the survey route (Brassey et al., 2012).

10.3.59 All woodland within the study area has potential to support squirrel populations, with three areas identified as suitable for red squirrel. Two red squirrel and one grey squirrel sightings were recorded during surveys for other species within the study area (Figure 10.9). Evidence of squirrels (i.e. dreys and feeding remains) was also recorded at nine locations within the study area.

Wildcat

10.3.60 The study area is generally considered to be south of the southern range of wildcat (Davis & Gray, 2010) and the majority of the study area was found to be unsuitable due to a relatively high degree of exposure and disturbance. Potentially suitable habitat was found to be present at the northern end of the study area, but this was relatively small as the larger wooded areas were subject to clear-felling (and hence disturbed). No signs of wildcat were recorded during surveys which included scat surveys for pine marten. Furthermore, SNH advised that it was '*not aware of any records and wildcat is not expected to be an issue in the locations affected by the Luncarty proposal*' (25 September 2013 meeting), although did subsequently advise during their review of the draft ES that the proposed scheme '*includes the edge of what is considered to be the wildcat range, there are records of wildcat from Caputh, within 10km of Pass of Birnam*'. These records are from a period of 1941 to 1974 (as indicated by NBN gateway) from an area to the north of the River Tay and are disconnected from the proposed scheme location except by the B9099 road-bridge.

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

- 10.3.61 On the basis of low habitat suitability and lack of any records of species presence within the last 40 years, this species was scoped out of the impact assessment after the initial desk study and field surveys and no mitigation was proposed as no impact to receptor pathway was identified.

Otter and Water Vole

- 10.3.62 Otter (*Lutra lutra*) and water vole (*Arvicola amphibius*) surveys of the watercourses within the study area were conducted between April and August 2013. In addition, monitoring was undertaken where there was potential for a holt to be used for breeding. Detailed baseline information is presented in Appendix A10.4 (Confidential – Otters) and summarised below.
- 10.3.63 Desk based research provided otter records (spraints) from 2006 in the Bankfoot area. The DMRB Stage 2 assessment reported extensive otter activity based on spraints and footprints, identifying two watercourses as forming a significant part of an otter territory (Atkins, 2009).
- 10.3.64 Eleven watercourses and their tributaries were surveyed for the presence of otter. Otters were found to be using watercourses throughout the study area, with spraint and footprints widespread. However, only two holts were recorded. Eight temporary shelters were also found.
- 10.3.65 A data search on NBN Gateway (NBN, 2013) did not provide any records of water voles within the study area. The DMRB Stage 2 assessment identified one unverified record of water voles from the Murthly estate in 2005 (NO 073 393) (Atkins, 2009). No evidence of water voles was recorded during surveys and therefore they have been scoped out of further assessment.

Amphibians

- 10.3.66 Amphibian baseline information is presented in Appendix A10.3 (Section 13: Amphibians) and summarised below.
- 10.3.67 A desk study showed no records of great crested newt (GCN) within the study area. The nearest confirmed records of GCN are found 18km south-west of the proposed scheme (JNCC, 2013b), at Turflundie Wood SSSI/SAC.
- 10.3.68 A total of 18 waterbodies were identified and assessed for their suitability for GCN using the Habitat Suitability Index (HSI) (Figure 10.7). Six of these were identified as having GCN potential and surveys were undertaken between the end of April and June 2013. One of these ponds (P10) was not possible to formally survey due to the large area of deep boggy ground and the usage of artificial refuges placed around the area was investigated as an alternative. Three of the 18 ponds could not be formally surveyed as they were identified during an extension to the study area which took place after the survey season.
- 10.3.69 Surveys did not find any evidence for the presence of great crested newt. Palmate newts were found in two ponds P13 (Muir of Thorn) and P15 (Gelly). In addition, an eft was found in pond P4 during freshwater surveys and a smooth newt was recorded near Cairnleith Moss SSSI. Bottle trapping at pond P4 recorded only a large population of three-spined stickleback (*Gasterosteus aculeatus*). No amphibians were recorded from the artificial refuges, although a common lizard (*Zootoca vivipara*) was recorded on two occasions.

Deer

- 10.3.70 Deer baseline information is presented in Appendix A10.3 (Detailed Terrestrial and Freshwater Ecological Baseline Data) and summarised below.
- 10.3.71 Deer casualties have been recorded along the full length of the proposed scheme. In a ten year period (2003 to 2012 inclusive), 49 deer casualties were recorded in the vicinity of this section of the A9 and one deer casualty was recorded on the B867 in Bankfoot (Langbein Wildlife Associates, Deer Casualty and Collisions Database). From the data received no particular areas of high activity

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

such as crossing points could be identified. The deer species was not recorded although species recorded in the area include fallow deer (*Dama dama*) and roe deer (*Capreolus capreolus*).

- 10.3.72 Road traffic accident data for this section of the A9 were reviewed by the project design team in terms of road safety, and did not indicate that any of the recorded road accidents were caused by deer. Consultation with the operating company also confirmed that deer are not identified as a particular issue in this area. Deer fencing was recorded around areas of woodland in the northern part of the study area only. The fencing appeared to be primarily concerned with protecting the woodland and not from preventing the movement of deer onto the existing A9 carriageway.

Aquatic Habitat / River Habitat

- 10.3.73 River habitat baseline information is presented in Appendix A10.3 (Detailed Terrestrial and Freshwater Ecological Baseline Data) and summarised below. No information specific to river habitats was received during consultation.
- 10.3.74 A desk study found that SEPA classified the Shochie and Ordie burns as having a minimum of Good Ecological Status.
- 10.3.75 The DMRB Stage 2 assessment (Atkins, 2009) noted that Shochie Burn runs through a mixture of land uses and has diverse pool and riffle flow habitats. The lower Ordie Burn exhibits features associated with an active river channel and is suitable for supporting salmonid spawning. Downstream of the A9 both the Shochie and Ordie burns contained a higher sediment load.
- 10.3.76 A River Habitat Survey (RHS) was undertaken in May 2013 on the Shochie Burn and Garry Burn, and two sites on the Ordie Burn (lower and upper) (Figure 10.11). All sites coincide with areas that may be affected by crossings or the receiving of discharge associated with the proposed scheme. RHS assessment indicated that the Shochie and upper Ordie were Obviously Modified with Habitat Quality Assessment scores of 3 (and equivalent high Habitat Modification Scores), whilst the upper Ordie Burn and Garry Burn sites were significantly modified. In all four watercourses the assessment of modification is driven principally through the presence of embankments, re-sectioning of the natural planform and reinforcements associated with the existing A9 road culvert of outfall head walls. On the lower Ordie a major weir was also impounding water through the survey reach, affecting the habitat score for this reach.
- 10.3.77 Despite the Habitat Modification Scores evidence of natural processes were evident on each tributary, with predominantly natural bank and substrate forms leading to active channel geomorphology and the natural deposition and erosion as would be expected of high energy burns.
- 10.3.78 Named and unnamed watercourses were shown to have low habitat quality characterised by lower substrate, flow and riparian zone diversity. Channel modification, particularly re-sectioning or reinforcement appeared more widespread and was a result of adjacent land use.

Freshwater Invertebrates

- 10.3.79 SEPA provided freshwater invertebrate data for a single site (the Garry Burn), sampled in 2008 and 2009. No further information specific to freshwater invertebrates was received through consultation.
- 10.3.80 SEPA classified the freshwater invertebrate communities of the Shochie and Ordie burns as having High Ecological Status (HES) for quality and richness.
- 10.3.81 Incidental data collected during the DMRB Stage 2 assessment (Atkins, 2009) showed the Shochie Burn supported a diverse assemblage of freshwater invertebrates representing good – high water quality. The freshwater invertebrate diversity of the Ordie Burn was noted as potentially depressed at this time due to low energy types and sedimentation downstream of the A9 crossing.
- 10.3.82 Freshwater invertebrates were sampled from five named watercourses, Shochie, Garry, Ordie, Gelly and Ardonachie burns, during May and late August 2013.

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

- 10.3.83 Biological metrics indicated biological communities dominated by Ephemeroptera (mayfly), Plecoptera (stonefly) and Trichoptera (caddis fly). High abundances of EPT taxa are indicative of good water quality and are positively correlated with higher energy flow types. This was supported by the high Biological Monitoring Working Party (BMWP), Average Score Per Taxon (ASPT) and taxon richness metrics. Freshwater invertebrates identified from both the May and August 2013 surveys are predominantly pollution and flow sensitive and as such will be sensitive to change to the ecosystem.
- 10.3.84 Community level conservation indices indicated that the Shochie Burn supported an invertebrate community of 'fairly high conservation value' (Community Conservation Index (CCI) score between 10-15) whilst the Ordie, Ardonachie and Gelly burns were recorded as being of 'moderate conservation value' (CCI score between 5-10). Garry Burn conservation value ranged from 'fairly high' in spring to 'moderate' in summer. Conservation value at these sites is driven by the high taxon richness, as opposed to the presence of rare taxa or taxa being present outside of their natural range. One species of conservation interest, the regionally notable stonefly, *Protonemura meyeri*, was recorded from the Shochie Burn in August 2013.

Freshwater Pearl Mussel

- 10.3.85 No freshwater pearl mussels (*Margaritifera margaritifera*) were identified in the study area. The NBN Gateway (NBN, 2013) returned four records within a 10 km grid square for this species, but all are more than 35 years old. SNH confirmed in a meeting in September 2013 that freshwater pearl mussel were unlikely to be present, and this species was scoped out of further assessment.

Macrophytes

- 10.3.86 The DMRB Stage 2 assessment (Atkins, 2009) reported a JNCC red data book species, river jelly lichen (*Collema dichotomum*), opposite Shochie Burn confluence with the River Tay in 2008.
- 10.3.87 SEPA classifies the macrophyte communities of the Shochie and Ordie burns as demonstrating High Ecological Status (HES). This indicates that the macrophyte communities on these burns are at, or exceeding, reference conditions for this water body typology.
- 10.3.88 Macrophyte surveys were undertaken at four locations which are crossed by the proposed scheme; Shochie Burn, lower Ordie Burn, upper Ordie Burn and Garry Burn. Two sites were chosen on the Ordie Burn due to obvious differences in macrophyte communities between the two sites and to capture the wide range of species in the Burn. At all sites, very few vascular plants were present; with bryophytes and algae predominating. Macrophyte cover was generally low, most likely due to heavy shading. No species of conservation interest were recorded at any of the sites. Ecological status was assessed as 'high' for the Shochie Burn and lower Ordie Burn, 'good' for the upper Ordie Burn and 'moderate' for the Garry Burn.

Pond Habitats

- 10.3.89 Four ponds were identified as suitable for survey and sampled for freshwater invertebrates and macrophytes in May and June 2013. A single pond was reported as a wetland area, with insufficient water to enable invertebrate sampling. Data were analysed by Pond Conservation to determine status and assess ecological communities against UKBAP pond criteria.
- 10.3.90 All surveyed ponds were reported as being of 'poor' ecological status, indicating the macrophyte and invertebrate communities were poorer than expected for ponds of their typology. No invertebrate species of conservation interest were recorded during the pond surveys. However, two species of freshwater macrophyte, pond water crow foot (*Ranunculus peltatus*) and lesser pondweed (*Potamogeton pusillus*), which are of local conservation interest, were identified.

Freshwater Fish

- 10.3.91 SEPA classifies the fish populations of the Shochie and Ordie burns as having High Ecological

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

Status (HES) for all fish metrics (ecology and barriers to migration) despite the overall ecological classification being Good Ecological Status (GES). This indicates that the fish populations on these burns are at or exceeding reference conditions for this water body typology.

- 10.3.92 Atlantic salmon are recorded as a primary reason for the selection of the River Tay as a SAC and all three lamprey species (brook, sea and river) are recorded as qualifying species. Historically, Atlantic salmon have been recorded on the Shochie, Ordie and Garry burns. Recent studies show that juvenile salmon, sea and brown trout are present on the Shochie Burn, and salmon and migratory trout are present on the Ordie Burn (Tay District Fisheries Board, 2009). Recent studies of lamprey (APEM, 2002; 2004; Watt et al., 2008) indicate they are spread throughout the Tay catchment and are likely to utilise many of the tributaries of the wider catchment.
- 10.3.93 No consultation data were obtained to indicate the presence of other salmonids or coarse fish from watercourses within the study area. However, the Tay District Salmon Fisheries Board (DSFB) confirmed that the system is a productive one for spawning Atlantic salmon and brown trout. Tay DSFB advised that Brown trout, grayling (*Thymallus thymallus*), pike (*Esox lucius*), perch (*Perca fluviatilis*) and roach (*Rutilus rutilus*) are known from watercourses within the River Tay catchment.
- 10.3.94 Four sites on three named waterbodies (Shochie Burn, Ordie Burn (lower and upper) and Garry Burn) were surveyed for freshwater fish during May 2013.
- 10.3.95 Of the SAC qualifying species, only lamprey (a subset of which was identified as brook lamprey), were recorded on the Shochie, Ordie and Garry burns. Other species of conservation interest reported from fisheries surveys include European eel (*Anguilla anguilla*) from Shochie Burn and the upper Ordie Burn, sea trout from the Shochie Burn and brown trout. The latter was found in high abundance at all surveyed sites. Habitat assessment undertaken in conjunction with fish surveys characterise all three water bodies as supporting habitats with diverse flow, substrate and marginal habitats, suitable for a range of salmonid, lamprey and eel life-stages. Outputs of habitat assessment are described in Appendix A10.3.
- 10.3.96 All three species of lamprey are qualifying features of the River Tay SAC, although not a primary reason for its selection. The presence of at least one lamprey species, in at least 75% of the surveyed sites, indicated that this species of conservation interest was distributed through the catchment areas within the study area.
- 10.3.97 No primary species for qualification of the SAC, such as Atlantic salmon, were recorded during the May 2013 fish survey. The absence of salmon during the May 2013 surveys should not be accepted as the absence of this species from these watercourses. Given the presence and abundance of brown trout, and observations of lamprey (seen but not caught), European eel and sea trout (all of which will undertake migrations within, and/or between catchments) each of the surveyed catchments should be assumed accessible to other migratory salmonids.

Evaluation of Species and Habitats

- 10.3.98 The evaluation presented in Table 10.7 on the following page takes into account baseline conditions and utilises the criteria in Table 10.1, to develop an understanding of the implications for receptors that may be affected by the proposed scheme. Appendix A10.5 (Evaluation of Terrestrial and Freshwater Ecological Receptors) provides full detailed information on evaluations for all receptors potentially affected. The results of the evaluation have been used to design specific and appropriate mitigation.
- 10.3.99 It should be noted that watercourses forming part of, or connected to, the River Tay SAC could be considered to be of international value due to connectivity with the SAC, despite having limited supporting ecological functionality for the SAC. For the purposes of assessment however, evaluation of these watercourses and receptors associated with them is informed by baseline data and principles identified in Table 10.1.

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

Table 10.7: Summary Evaluation of Habitats and Species

Area/Habitat Name	Features of Interest	Evaluation
Terrestrial Habitats (Figure 10.2)		
River Tay SAC	European site designated for its oligotrophic to mesotrophic standing waters, and for five species (European otter, Atlantic salmon, brook lamprey, river lamprey and sea lamprey).	International
Cairnleith Moss SSSI	A complex mosaic of wet heath, swamp, open water, scrub and acid grassland communities.	National
Mill Dam SSSI	A small area of open water with fen and reed-swamp which contains uncommon, locally rare and nationally scarce species.	National
Ancient woodland (Byres Wood)	Broad-leaved woodland with some potential ancient woodland indicator species. Partly felled and re-planted with some bracken and rhododendron invading.	Authority area
Long-established plantation woodland	Coniferous plantation woodland.	Local
Semi-natural broadleaved woodland	Species-poor woodland with mature trees in the Gelly Woods area.	Local
Semi-natural broadleaved and coniferous woodland	Small pockets with a poorly developed understorey, often containing non-native species such as sycamore.	Local
Marshy grassland	(Outside the SSSI). Low species richness with evidence of agricultural improvement. Occasional species of conservation interest.	Local
Heathland and bog	Dry heath, wet heath and heath/grassland mosaic within plantation woodland areas. Characteristic of modified habitats.	Local
Agricultural land	Poor semi-improved grassland, improved grassland and arable. Low species diversity.	Less than Local
Lesser butterfly-orchid	SBL species.	National
Greater butterfly-orchid	SBL species.	National
Fragrant orchid	No conservation status.	Local
Northern marsh orchid	Frequent species with no conservation status.	Local
Terrestrial Invertebrates (Figure 10.3)		
1 Shochie Burn	Moderate habitat potential, three LBAP species recorded.	Authority area
2 Lower Ordie Burn	Moderate habitat potential.	Local
3 Upper Ordie Burn	Moderate habitat potential.	Local
4 Five Mile Wood	Low habitat potential.	Less than Local
5 Garry Burn	Moderate habitat potential.	Local
6 Cairnleith Moss SSSI	Moderate habitat potential, one SBL species recorded.	National
7 Semi-natural broad-leaved woodland by A9	Moderate habitat potential.	Local
8 Muir of Thorn (south)	Moderate habitat potential, one LBAP species recorded.	Authority area

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

Area/Habitat Name	Features of Interest	Evaluation
9 Gelly Woods	Moderate habitat potential, one LBAP species and one SBL species recorded.	National
10 Muir of Thorn (north)	Moderate habitat potential.	Local
11 Mill Dam SSSI	Moderate habitat potential.	Authority area
12 Byres Wood	Moderate habitat potential.	Local
Cultivated land	Low habitat potential.	Less than Local
Bats (Figures 10.4 and 10.5)		
Luncarty	Provide roosting, foraging and commuting areas for locally important common and soprano pipistrelle bats.	Authority area
Shochie Burn	Features an area of standing water which offers foraging for Daubenton's and pipistrelle bats. Important for commuting, foraging and roosting. A population of <i>Myotis</i> bats were identified roosting within the Shochie Viaduct.	Authority area
Ordie Burn	Important foraging and roosting site for Daubenton's and both pipistrelle species and commuting route for <i>Myotis</i> and pipistrelles. Five confirmed roosts in properties and a bridge, and trees with high roost potential present.	Authority area
Newmill	Confirmed roosts for pipistrelle and brown-long eared bats in buildings and trees with features with the potential to support roosting bats.	Authority area
Westwood	The area provides potential roosting and hibernation features in the form of a quarry and nearby mature trees. The tree-lined western edge of the A9 provides foraging and commuting opportunities for all bat species.	Authority area
Garry Burn	Foraging and commuting available in the area. Confirmed roost in a building close to burn. The trees present with features with the potential to support roosting bats.	Authority area
Bankfoot	Roosting, commuting and foraging in the area. <i>Nathusius'</i> pipistrelle in the region is currently unknown and this is a notable record.	Regional
Coltrannie/Cairnleith Crossing	Commuting and foraging available along with mature trees with the potential to support roosting bats present.	Regional
Muir of Thorn woodland	Commuting and foraging available. Five species of bats recorded in the area including <i>Nathusius'</i> pipistrelle.	Authority area
Gelly Wood	Semi-natural coniferous woodland offers moderate potential to support bats. A number of trees were identified as having features with high potential to support a roost and common, soprano and <i>Nathusius'</i> pipistrelles were recorded commuting and foraging in the area.	Regional
Murthly Estate (north)	Area offers foraging habitat for all species of bats. A mixture of trees offering features suitable to support roosting bats.	Regional
Byres of Murthly/Mill Dam SSSI	Area offers high roosting, foraging and good commuting habitat. Three tree roosts identified.	Authority area
Badger		
n/a	n/a	n/a
Breeding Birds (Figure 10.6)		
Quadrat 1	Comprises of an area of mature open mixed woodland surrounded by arable fields and grassland with well developed hedgerows and scattered trees. A number of residential properties are also present. Twenty nine bird species were recorded including four JNCC red list species.	Local
Quadrat 2	Contains a section of Cairnleith Moss to the north with a patch of open mature mixed woodland adjacent. The southern section is includes areas of arable land with scattered farm buildings. Thirty two bird species were recorded including six JNCC red list species,	Authority area
Quadrat 3	Comprises of an area of open mature coniferous plantation and pasture land to the north. The southern section comprises dense coniferous plantation with	National

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

Area/Habitat Name	Features of Interest	Evaluation
	an area of birch (<i>Betula</i> sp.) woodland and blanket bog leading south towards Carinleith Moss. Twenty three bird species were recorded including two JNCC red list species. One species listed on Annex 1 The Birds Directive, WCA1i, JNCC amber listed, SBL and LBAP.	
Quadrat 4	Contains an area of coniferous plantation woodland to the north with adjacent areas of heather moorland, wet grassland and pasture land. The southern section contains an area of mixed deciduous woodland and arable fields. Twenty seven bird species were recorded including two JNCC red list species.	Local
Quadrat 5	Consists of conifer plantation with areas of clear fell interspersed throughout. The northern section has areas of pasture land and wet grassland with fringing mixed deciduous woodland and scattered dwellings. Twenty nine bird species were recorded including three JNCC red list species.	Local
Quadrat 6	Comprises of an area of heather moorland with areas of bog and mixed scattered trees to the south. The central section contains open mature coniferous plantation woodland and an area of young dense coniferous planation. The northern area of the quadrat has recently been clear felled. Twenty four bird species were recorded including two JNCC red list species.	Local
Reptiles (Figure 10.7)		
Woodland East	Drystone walls and long standing woodland.	Less than Local
Woodland West	Long standing woodland.	Less than Local
Cairnleith Moss SSSI	Rank tussocky grassland with scrub cover and an unobstructed view of the sun for most of the day. Habitat features such as woodland edge and drystone walls also present.	Less than Local
Gelly Muir	Area of heath with an unobstructed view of the sun throughout the day. Habitat features such as woodland edge habitat and drystone walls in the local area.	Local
Area of clearfell	Large piles of brash and wood debris from felling of the site. Unobstructed view of the sun all day.	Less than Local
Murthly Muir	Area of heath with an unobstructed view of the sun throughout the day. Habitat features such as woodland edge habitat and deep tussocks of vegetation are present throughout.	Less than Local
Pine Marten (Figure 10.8)		
Muir of Thorn and Gelly Wood	Area dominated by mature conifer plantation with a mosaic of non-wooded habitats including grassland throughout, sustaining vole populations.	Authority area
Red Squirrel (Figure 10.9)		
Muir of Thorn	Red squirrel recorded in woodland. Habitat quality medium to high quality and no grey squirrel present.	National
Gelly Wood	Red squirrel recorded in woodland. Habitat quality medium to high quality and no grey squirrel present.	National
Five Mile Wood	Red and grey squirrel recorded in woodland (NBN records). Medium quality habitat.	Regional
Wildcat		
n/a	n/a	n/a
Otter (Figure 10.10 – CONFIDENTIAL) & Water Vole (n/a)		
Shochie Burn	High habitat quality offering foraging, commuting and shelter opportunities. Signs of otter recorded. Part of River Tay SAC for which otter are a qualifying feature.	International
Shochie Burn Loch	High habitat quality offering foraging, commuting and shelter opportunities. Signs of otter recorded. Part of River Tay SAC for which otter are a qualifying feature.	International

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

Area/Habitat Name	Features of Interest	Evaluation
Benchil Burn	Medium habitat quality used for commuting. Signs of otter recorded. Burn extends foraging and shelter habitat of Ordie Burn.	Authority area
Ordie Burn	High habitat quality offering foraging, commuting and shelter opportunities. Signs of otter recorded. Part of River Tay SAC for which otter are a qualifying feature.	International
Gelly Burn (south)	Medium habitat quality used for commuting. Signs of otter recorded. Burn extends foraging and shelter habitat of Ordie Burn.	Authority area
Garry Burn	High habitat quality offering foraging and commuting. Signs of otter recorded. Part of River Tay SAC for which otter are a qualifying feature.	International
Ardonachie Burn	Low to medium habitat quality used for commuting. Signs of otter recorded.	Local
Corral Burn	Low to medium habitat quality used for commuting. Signs of otter recorded.	Local
Gelly Burn (north)	Low to medium habitat quality used for commuting. Signs of otter recorded.	Local
Broomhill Burn	Low to medium habitat quality used for commuting. Signs of otter recorded.	Local
Birnam Burn	Low habitat quality used for commuting. Signs of otter recorded.	Local
Amphibians (Figure 10.7)		
P2	Moderate terrestrial and aquatic habitat quality. Common frog present.	Local
P4	Poor terrestrial habitat and moderate aquatic habitat quality. Common or palmate newts and common frog present.	Local
P8	Moderate terrestrial and aquatic habitat quality.	Local
P9	Moderate terrestrial and aquatic habitat quality. Common frog present.	Local
P10	Moderate terrestrial habitat and high aquatic habitat quality. No amphibians found.	Less than Local
P13	Moderate terrestrial habitat and high aquatic habitat quality. Palmate newt and common frog present.	Local
P15	Moderate terrestrial habitat and high aquatic habitat quality. Palmate newt and common frog present.	Local
P16	Moderate terrestrial habitat and high aquatic habitat quality.	Local
P17	High terrestrial habitat and high aquatic habitat quality.	Local
P18	Moderate terrestrial habitat quality.	Local
Aquatic Habitat / River Habitat (Figure 10.11)		
SEPA designated rivers/burns (see below)	Mixed value dependent on degree of channel modification. Rivers and burns UKBAP habitat.	Regional/ Authority area
Shochie Burn	Habitat Modification Score indicating Obviously Modified.	Regional
Ordie Burn (upper)	Habitat Modification Score indicating Obviously Modified.	Regional
Ordie Burn (lower)	Habitat Modification Score indicating Significantly Modified.	Authority area
Garry Burn	Habitat Modification Score indicating Significantly Modified.	Authority area
Named burns	Non-designated, low to medium quality habitat. Low to moderate flow and remaining wet throughout the year. Medium to high water quality.	Authority area

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

Area/Habitat Name	Features of Interest	Evaluation
Unnamed tributaries & drains	Non-designated, low quality habitat. Low to medium water quality.	Less than Local
Freshwater Invertebrates (Figure 10.11)		
Shochie Burn	WFD classification of high status, community conservation scores of 'fairly high' (spring and summer).	Authority area
Ordie Burn	WFD classification of high status, community conservation scores of 'fairly high' (spring) and 'moderate' (summer).	Authority area
Garry Burn	WFD classification of high status, community conservation scores of 'fairly high' (spring) and 'moderate' (summer).	Authority area
Ardonachie burn	WFD classification of high status, Community conservation scores of 'moderate' (spring and summer).	Authority area
Gelly Burn	WFD classification of good status, Community conservation scores of 'moderate' (spring and summer).	Local
Freshwater Pearl Mussel		
n/a	n/a	n/a
Macrophytes (Figure 10.11)		
Shochie Burn	LEAFPACS score indicating high habitat value (0.97).	Regional
Ordie Burn (lower)	LEAFPACS score indicating high habitat value (0.89).	Regional
Ordie Burn (upper)	LEAFPACS score indicating good habitat value (0.72).	Authority area
Garry Burn	LEAFPACS score indicating moderate habitat value (0.51).	Less than Local
Pond (Figure 10.11)		
Pond 4	PSYM (Predictive SYstem for Multimetrics,) score indicating poor ecological status; ponds listed on LBAP. An area of habitat considered to appreciably enrich the habitat resource. One plant of local conservation status.	Authority area
Pond 8	PSYM score indicating poor ecological status; SUDS pond, not a viable LBAP habitat; An area of habitat considered to appreciably enrich the habitat resource.	Local
Pond 9	PSYM score indicating poor ecological status; SUDS pond, not a viable LBAP habitat. An area of habitat considered to appreciably enrich the habitat resource. One plant of local conservation status.	Local
Pond 15	PSYM score indicating poor ecological status; ponds listed on LBAP. An area of habitat considered to appreciably enrich the habitat resource.	Authority area
Freshwater Fish (Figure 10.11)		
Shochie Burn	Part of the River Tay SAC. Eel and lamprey sp. recorded in the watercourse.	International
Ordie Burn	Part of the River Tay SAC. Eel and lamprey sp. recorded in the watercourse.	International
Garry Burn	Part of the River Tay SAC. Lamprey sp. recorded in the watercourse.	International

10.4 Potential Impacts

Introduction

10.4.1 Infrastructure projects, including roads, have a range of well-documented impacts associated with their construction and operation. This section identifies the potential risks and impacts of the proposed scheme upon terrestrial and freshwater ecological receptors in the absence of mitigation.

General Impacts

10.4.2 Potential impacts associated with this type of project (presented in detail in Appendix A10.7), identified through reference to the DMRB guidelines and recommendations (The Highways Agency et al., 1993a; 1993b), include:

- direct mortality of animals on roads during construction and operation;
- behavioural changes of animals during operation;
- habitat loss through land-take;
- fragmentation of existing habitats;
- physical obstructions caused by road constructions and bridges;
- disturbance during construction;
- pollution via road drainage, runoff and spray from road traffic;
- air pollution (e.g. nitrogen deposition); and
- visual and light pollution caused by road lighting, if included.

10.4.3 Although changes in air quality can be a potential impact associated with road operation due to vehicle emissions, it is concluded after the consideration of the results of the air quality assessment (Chapter 14: Air Quality) that there are no implications for designated sites or species potentially affected by changes in air quality due to the proposed scheme.

10.4.4 Additionally, for species relying on aquatic resources potentially affected by watercourse crossings, piling operations and surface water runoff, the following potential impacts are also considered:

- point source and diffuse pollution;
- increased sediment loading;
- decreased habitat complexity;
- habitat fragmentation; and
- changes to discharge regime.

10.4.5 Full information on the surface water environment, including a consideration of surface water hydrology, flood risk, fluvial geomorphology and water quality, can be found in Chapter 9 (Road Drainage and the Water Environment). Full information on potential noise and vibration impacts can be found in Chapter 15 (Noise and Vibration).

10.4.6 It is important to recognise that potential impacts may interact (e.g. habitat loss during construction could potentially result in disturbance and habitat fragmentation) and the resulting combination of impacts may, through synergistic effects, increase the overall adverse impact of the proposed scheme (Luell et al., 2003).

Specific Impacts

10.4.7 A summary of potential impacts considered by the specific impact assessment is presented in Appendix A10.6. As explained in Section 10.2 (Approach and Methods), in the absence of

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

mitigation, all potential impacts described below would be considered as significant in accordance with IEEM guidance. Mitigation is proposed to avoid, reduce or offset these potential impacts in Section 10.5 (Mitigation).

- 10.4.8 The specific impacts likely to occur during construction and operation of the proposed scheme and the effects these impacts could potentially have on identified receptors is summarised below. The potential impacts described below are all considered to be adverse unless otherwise stated.

Designated Sites

Construction

- 10.4.9 Particulate deposition of material arising from construction materials could result in limited impacts close to the Cairnleith Moss SSSI is assessed as being of medium negative magnitude.
- 10.4.10 As a result of construction activity, temporary loss of the River Tay SAC habitat may occur. Changes in water flow may also alter habitats, or from increased sedimentation. Habitat fragmentation may also occur.
- 10.4.11 Mortality of SAC qualifying species could occur through loss of breeding habitat, changes in prey distribution and on-site incidents such as impacts to water quality. In addition, otter risk becoming trapped in pits, piping, chemical containers or wire mesh etc.

Operation

- 10.4.12 New culverts/extensions will result in a direct loss of a small area of SAC habitat (0.0003%). Changes in water flow and/or sedimentation may also result in habitat loss/sedimentation. Structures may also result in habitat fragmentation, which could result in direct mortality of otter as a result of attraction onto the carriageway. Increased carriage-way width could also result in direct mortality of otter.
- 10.4.13 Road run-off could affect water quality which could affect the qualifying species of the SAC.

Terrestrial Habitat

Construction

- 10.4.14 As a result of activity during construction, disturbance to habitats could occur, especially riparian vegetation around watercourses including the Shochie Burn and the Ordie Burn. This potential impact is assessed as being of medium negative magnitude.
- 10.4.15 The potential for terrestrial habitat pollution is likely to be predominantly associated with the run-off of construction materials including sediment and oils onto semi-natural habitats, potentially resulting in adverse impacts to these habitats. Further, particulate deposition of material arising from construction materials could result in limited impacts close to the construction site.
- 10.4.16 It is possible that the transfer of invasive non-native species could occur during earthmoving, the creation and use of proposed temporary access roads and site compounds, and during works close to waterbodies. This potential impact is assessed as being of medium negative magnitude.

Operation

- 10.4.17 Permanent habitat loss or habitat change would occur as a result of the new road infrastructure. Loss of mature trees and broadleaved woodland is assessed as being of a medium negative magnitude. Loss of coniferous plantation is assessed as being of low negative magnitude. The predicted loss of habitat in hectares within the CPO boundary is presented in Table 10.8.

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

Table 10.8: Habitat Type and Approximate Habitat Loss within the CPO

Habitat Type	Approximate Habitat Loss (ha)
Amenity Grassland	0.01
Arable	35.97
Broadleaved Plantation	0.32
Broadleaved Semi Natural Woodland	6.67
Coniferous Plantation	3.10
Coniferous woodland - recently felled	0.41
Dense Scrub	0.20
Disused Quarry	0.06
Dry Dwarf Shrub Heath	0.00
Improved Grassland	4.63
Marshy Grassland	0.71
Mixed Plantation	0.17
Pond/Fen	0.05
Poor Semi-improved Grassland	2.59
Standing Water (Pond)	0.05
Tall Ruderal	0.78
Wet Dwarf Shrub Heath	1.33
Total	57.05

Note: Total habitat loss is less than total land-take reported in Chapter 7 (Community and Private Assets) as the ecological assessment does not take into account built-up areas/hardstanding.

- 10.4.18 It should be noted that within the CPO there are also areas of woodland to be retained. The CPO includes 4.72ha of broadleaved semi-natural woodland at Shochie Burn, Ordie Burn, Westwood and an area north east of the Coltrannie/Cairnleith Overbridge, to enable the provision of bat boxes as essential mitigation for the proposed scheme.

Terrestrial Invertebrates

Construction

- 10.4.19 Earthworks and heavy machinery could potentially have impacts (such as displacement or mortality) on slow moving, flightless, ground dwelling terrestrial invertebrates. This is assessed as being of medium negative magnitude in land parcels 1-3 and of low negative magnitude in land parcels 5-10 and in cultivated land (as noted in Section 10.3: Baseline Conditions of this chapter, land parcels were identified as representative of the different types of habitats found in the study area and are shown on Figure 10.3).
- 10.4.20 Land beyond that of the proposed scheme footprint will be required to construct the proposed scheme (i.e. land contained within the CPO), and will result in temporary or potentially longer term habitat loss or modification. Most terrestrial invertebrates have complex life cycles which require different habitat requirements for stages in life cycle – this increases their sensitivity to habitat loss. This potential impact is assessed as being of low negative magnitude.
- 10.4.21 Pollution may affect terrestrial invertebrates in a variety of ways, including desiccation through salt pollution and bioaccumulation of heavy metals through food chains, eventually resulting in death or functional impairment. This potential impact is assessed as being of low negative magnitude.

Operation

- 10.4.22 Land-take under the footprint of the proposed scheme will result in permanent habitat loss. This impact is assessed as being of low negative magnitude.

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

- 10.4.23 Pollution sources from operational road traffic include salts, the deposition of tyre particles and products derived from petroleum combustion. However, it should be noted that the proposed scheme will replace existing carriageway and as such these pollution sources exist as part of the baseline conditions. The Stage 3 design also incorporates Sustainable Drainage Systems (SUDS) as described in Chapter 9 (Road Drainage and the Water Environment). This potential impact is assessed as being of low negative magnitude.

Bats

Construction

- 10.4.24 In the absence of appropriate mitigation measures being implemented, mortality can result from vegetation clearance associated with pre-construction activities through the destruction of bat roosting and hibernation sites, and subsequently bat breeding sites. Potential roosting sites which could be affected were identified in trees at Newmill and Westwood close to the A9, at Garry Burn, Coltrannie/Cairnleith Overbridge and in areas of woodland to be lost at Gelly Wood. Confirmed roost sites which could be affected were only identified near the Byres of Murthly. The potential impact is assessed as being of medium negative magnitude.
- 10.4.25 Habitat fragmentation can result from the temporary severance of commuting routes due to vegetation clearance and culvert works. This potential impact is assessed as being of low negative magnitude.
- 10.4.26 Disturbance during construction, for example during tree felling and demolition works, may impact bats as they would modify their behaviour to accommodate disturbance over a period of time. Light disturbance may result in some bat species avoiding lit areas to avoid predation by birds, though night-time works will not generally be required for construction of the proposed scheme. This potential impact is assessed as being of medium negative magnitude.
- 10.4.27 Effects of pollution on local watercourses from accidental spills during construction could potentially adversely affect the value of wetland feeding areas for bats. This potential impact is assessed as being of low negative magnitude.

Operation

- 10.4.28 Severance of commuting routes and the removal of sheltered corridors between habitats could affect access to resources and therefore could affect the long-term survival of populations of bats. Whilst the proposed scheme represents an upgrade to an existing road, a precautionary approach has been applied whereby this potential impact is assessed as being of medium negative magnitude.
- 10.4.29 Habitat loss under the footprint of the proposed scheme will result in the loss of roosting, foraging and commuting habitat. This potential impact is assessed as being of medium negative magnitude.
- 10.4.30 Road run-off during operation could potentially degrade the value of wetland feeding areas for bats. This potential impact is assessed as being of low negative magnitude.

Birds

Construction

- 10.4.31 In the absence of appropriate mitigation measures being implemented, mortality of adult birds, their eggs and un-fledged/fledged young during construction can result from pre-construction vegetation clearance. Disturbance to birds could occur as a result of construction activities and the presence of workers near breeding sites. This could lead to the direct mortality of eggs or unfledged young as adult birds may abandon nests due to prolonged disturbance events. The highest potential for impacts to occur is during the breeding season (March to August inclusive) and may constitute a prosecutable offence under the WCA (1981) (as amended). Direct mortality is assessed as being of

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

low negative magnitude, except where it pertains to barn owl (quadrat 2) and osprey (quadrat 3) where it is assessed as being of medium and high negative magnitude respectively. Potential disturbance is assessed as being of low negative magnitude (high negative magnitude for osprey).

- 10.4.32 Temporary loss of habitat could result from the construction works within the CPO that is not lost directly under the footprint of the proposed scheme. Habitat loss during construction may deprive breeding birds of nesting, foraging and roosting areas during the breeding season. Habitat clearance could additionally result in the direct loss of foraging habitat through the loss of plant food groups such as buds or berries and the indirect loss of invertebrate communities. Invertebrates and buds/berries form a major dietary constituent for the majority of small to medium sized bird species. This potential impact is assessed as being of low negative magnitude (quadrats 1, 5 and 6) or medium negative magnitude (quadrats 2-4).
- 10.4.33 Accidental spills of chemicals and other potentially toxic substances during construction may affect birds indirectly, through a reduction in prey availability, or bio-accumulation of toxic substances from prey material. This potential impact is assessed as being of low negative magnitude.

Operation

- 10.4.34 Many bird species will already cross the existing A9 to move between habitat fragments, however, the distance that birds may already fly to cross the road would increase as a result of the proposed scheme, potentially increasing the risk of direct mortality. This potential impact is assessed as being of low negative magnitude (high negative magnitude for barn owl).
- 10.4.35 Habitat for breeding birds would be lost permanently under the footprint of the proposed scheme (see above for potential impacts). In addition, indirect habitat loss (i.e. habitat degradation) could occur in areas adjacent to the proposed scheme, where an increase in noise and pollution from more traffic using the road could lead to birds moving out of the area and thus rendering potentially suitable habitat unsuitable for breeding bird populations. This potential impact is assessed as being of medium negative magnitude.
- 10.4.36 Disturbance resulting from noise and vibration is mainly influenced by traffic type, traffic intensity, road surface properties, topography and structure/type of adjacent vegetation. It is therefore likely that disturbance could result in noise and vibration associated with road traffic. This impact is assessed as being of low negative magnitude.
- 10.4.37 Run-off contaminated by pollutants during construction also has the potential to cause direct mortality to eggs or un-fledged chicks of ground nesting birds. An increased risk of accidental spills and runoff during operation as a result of increased traffic movements may have the same effects. This potential impact is assessed as being of low negative magnitude.

Reptiles

Construction

- 10.4.38 There is potential for reptile mortality to occur during the construction phase of the proposed scheme through activities such as site clearance and excavations. This potential impact is assessed as being of medium negative magnitude.
- 10.4.39 Vibrations from machinery and large vehicles may have an impact on reptiles and deter them from residing in habitats adjacent to the areas of disturbance. The storage of construction materials in sensitive areas in addition to removing debris such as logs and rubble, would also constitute disturbance to reptiles, the effects of which could be particularly detrimental if carried out during the breeding season or when reptiles are hibernating. This potential impact is assessed as being of low negative magnitude.

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

Operation

- 10.4.40 There is potential for reptile mortality during the operational phase of the proposed scheme due to road traffic. This risk is likely to be present in the current situation (baseline conditions), but could be increased slightly with the proposed scheme, as the width of the carriageway would be increased. This potential impact is assessed as being of medium negative magnitude.
- 10.4.41 Habitat loss is likely to affect reptiles where the upgrading of the road would result in the destruction of areas supporting suitable reptile habitat. The loss of certain habitat features of higher value to reptiles such as hibernacula may be particularly detrimental to reptiles. Although this habitat loss would occur during the construction phase of the proposed scheme, it is regarded as an operational impact since this habitat loss would be permanent. However, temporary habitat loss, for example through the siting of site compounds and storage areas are impacts associated with the construction phase of the proposed scheme. No additional habitat loss is envisaged during operation of the proposed scheme other than that associated with routine operational maintenance of roadside verge or similar areas, which is already undertaken as part of the baseline conditions due to the existing A9. Habitat loss is assessed as being of medium negative magnitude.

Pine Marten

Construction

- 10.4.42 Possible mortality during construction through tree felling, by works traffic clearing the site or indirect mortality through stress could occur. If there is a pine marten den present and in the absence of a licence issued by SNH, it is an offence under the Wildlife and Countryside Act (1981) (as amended for Scotland) and the Nature Conservation (Scotland) Act 2004, to undertake the tree clearance phase of the construction works, if this leads to the death (either directly or indirectly) of a pine marten. This impact is assessed as being of low negative magnitude.
- 10.4.43 Disturbance due to construction operations is predicted to represent a potential impact in areas where pine martens are present. Noise from machinery and vehicles, dust and the presence of humans could have potential adverse impacts. This impact is assessed as being of medium negative magnitude.

Operation

- 10.4.44 Direct mortality during the operational phase could occur in areas where pine marten are currently present. Pine martens may attempt to cross the carriageway during the operational phase of the proposed scheme, which would be wider, and therefore potentially increase the risk of mortality resulting from traffic. This impact may be present as part of baseline conditions due to the existing A9, but a precautionary approach has been applied whereby this is assessed as being of medium negative magnitude.
- 10.4.45 Habitat loss may arise in areas where pine marten are present. Although occurring during the construction phase, habitat loss is regarded as an operational impact, as the loss would be permanent. The loss of woodland habitat due to the proposed scheme may represent a loss of pine marten habitat and affect the long-term viability of woodland areas to support pine martens.
- 10.4.46 Edge effects along the dualled road could result in an increase of pollution, which may result in loss of usable woodland habitat by pine marten. This impact may be present as part of baseline conditions due to the existing A9, but a precautionary approach has been applied whereby this habitat loss is assessed as being of medium negative magnitude.

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

Red Squirrel

Construction

- 10.4.47 Mortality could occur during site clearance. If there is a drey present and in the absence of a licence issued by SNH, it is an offence under the WCA (1981) (as amended in Scotland) and the Nature Conservation (Scotland) Act 2004 to undertake the tree clearance phase of the construction works, if this leads to the death (either directly or indirectly) of a red squirrel. This potential impact is assessed as being of medium negative magnitude.
- 10.4.48 Disturbance through noise from machinery and vehicles, light for night working, dust and the presence of humans could all have adverse effects on red squirrel. This potential impact is assessed as being of medium negative magnitude.

Operation

- 10.4.49 Red squirrels may attempt to cross the carriageway during the operational phase of the proposed scheme, which would now be wider, and therefore be at increased risk of mortality resulting from traffic. This potential impact could affect a high proportion of the local population given that juvenile females aged from 10 to 18 weeks can move distances as much as 1.5km away from their parental woodland. This impact is assessed as being of medium negative magnitude.
- 10.4.50 The loss of woodland habitat due to the proposed scheme may represent key breeding and foraging habitat and could potentially affect the long-term viability of woodland areas to support red squirrels. In the absence of mitigation a reduction in habitat could potentially decrease the available food supply. This potential impact is assessed as being of medium negative magnitude.

Otter

Construction

- 10.4.51 There is the potential for direct mortality of otters during construction. Otter are inquisitive and can be attracted to construction works sites during to investigate machinery or spoil heaps, and therefore risk becoming trapped (e.g. pits, pipes, containers, wire mesh). As otters are largely nocturnal, any night works would present a higher risk, though night-time works are generally not expected to be required for the proposed scheme. This potential impact is assessed as being of high negative magnitude.
- 10.4.52 Habitat fragmentation during construction may prevent otter from moving freely within and between existing areas of habitat, particularly when they are situated in the vicinity of watercourses. This potential impact is assessed as being of medium negative magnitude on the Shochie, Ordie and Garry burns (including Ordie Burn Ditch), and high negative magnitude on the Ardonachie, Gelly (north) and Broomhill burns.
- 10.4.53 Disturbance from construction, the possible obstruction of otter pathways and the presence of humans would all have adverse impacts. This potential impact is assessed as being of medium negative magnitude.
- 10.4.54 Pollution of watercourses and water features could result in long-term damage to the productivity and diversity of nearby habitats, with an adverse impact on both otter and their food supply. There is also potential for accidental spillages (e.g. from oil and diesel drums). As well as reducing the amount of available prey, a particularly severe spillage can lead to contaminant bio-accumulation in prey species. This potential impact is assessed as being of low negative magnitude.

Operation

- 10.4.55 In the absence of mitigation, there is potential for direct mortality of otters during operation of the proposed scheme as a result of widening of the carriageway and new access routes over existing

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

otter commuting routes. Habitat loss and fragmentation could also occur as a result of land-take for cuttings, embankments and culvert extensions. This impact may be present as part of baseline conditions due to the existing A9, but a precautionary approach has been applied whereby this is assessed as being of high negative magnitude.

10.4.56 Habitat loss could occur through the construction of embankments and access roads and the extending of culverts where the roads cross watercourses. Taken together this potential impact is assessed as being of high negative magnitude.

10.4.57 Extension of culverts could result in further fragmentation of otter habitat and this potential impact is assessed as being of high negative magnitude.

10.4.58 Pollution of watercourses and water features in the area as a result of accidental spills and road run-off could have a direct adverse impact on otters and an indirect effect through an impact on their food supply. Severe spillages could lead to a bio-accumulation of contaminants in prey species which could also result in an accumulation of such material in otters. This potential impact is assessed as being of low negative magnitude.

Amphibians

Construction

10.4.59 There is the potential for direct mortality of amphibian species during vegetation clearance for construction activities, particularly when near to waterbodies P2, P8 and P9. This potential impact is assessed as being of medium negative magnitude.

10.4.60 Habitat loss is predicted to occur at ponds P2, P8 and P9 as a result of areas cleared for construction of embankments, slip roads and SUDS basins. This potential impact is assessed as being of low negative magnitude.

10.4.61 Disturbance of terrestrial amphibian habitat may occur at P2, P8 and P9 during construction of embankments, culverts and access routes. This potential impact is assessed as being of low negative magnitude.

10.4.62 Pollution due to construction of the main highway, access routes and from spillages and run-off has the potential to affect terrestrial and/or aquatic habitat for amphibians at ponds P2 and P4. This potential impact is assessed as being of low negative magnitude.

Operation

10.4.63 Aquatic amphibian habitat at ponds P8 and P9 will be lost under the proposed scheme footprint, including areas required for new SUDS basins. This potential impact is assessed as being of low negative magnitude.

10.4.64 Pollution from road spray, drainage and run-off has potential to affect aquatic habitat at P2. This impact may be present as part of baseline conditions due to the existing A9, but a precautionary approach has been applied whereby this is assessed as being of low negative magnitude.

Deer

Operation

10.4.65 During operation of the proposed scheme, deer may collide with vehicles using the A9. As noted in paragraph 10.2.18, deer is not a species of conservation concern, but is included in this chapter in the context of potential collisions with vehicles.

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

Aquatic Habitat / River Habitat

Construction

- 10.4.66 The loss of river habitat, associated with bank and bed re-sectioned and reinforcement for culverts would reduce in-channel habitat variation in the vicinity of the works on all crossing points. The loss of natural bank profiles may interfere with natural geomorphological processes whilst the necessary clearance of banks would reduce riparian stream shading and marginal cover. Riparian vegetation could also act as a buffer, removing or reducing the amount of pollutants entering a watercourse; loss of this vegetation could remove this buffer. This potential impact is assessed as being of medium negative magnitude.

Freshwater Invertebrates

Construction

- 10.4.67 Sedimentation from construction sources may smother substrates, leading to the deterioration of interstitial habitats and reduced feeding success in freshwater invertebrates. Changes to substrate may alter food chains, invertebrate refuges and spawning areas. This potential impact is assessed as being of low negative magnitude.
- 10.4.68 Aquatic organisms are particularly sensitive to soluble inorganic pollutants and mortality of invertebrates may be caused by relatively low levels of soluble metal salts, notably those of cadmium (Cd), lead (Pb), copper (Cu) and zinc (Zn). Invertebrates may avoid contaminated areas, thereby reducing available habitat area and reducing feeding and growth rates. The potential impacts are assessed as being of low negative magnitude.
- 10.4.69 Changes in hydrologic condition, as a result of dewatering or over-pumping, may affect localised flow patterns, reduce habitat diversity and may reduce the suitability of habitat for more sensitive species. Increased flows from dewatering of excavations, increased surface run off from site compounds and road drainage can also affect sediment patterns and alter habitats. This potential impact is assessed as being of low negative magnitude.
- 10.4.70 Temporary habitat fragmentation and loss may also occur should the channel require dewatering or pumping around during extension of culverts. Freshwater invertebrates rely on invertebrate drift to maintain community diversity from upstream connectivity. A temporary break in the connectivity between upstream source habitats has the potential of reducing diversity downstream of the road crossing. Upon reconnection with flows from the original channel following the construction period, invertebrates are likely to re-colonise the area from upstream sources. These potential impacts are assessed as being of low negative magnitude.

Operation

- 10.4.71 Pollution, as a result of road drainage, could enter watercourses during operation. Road drainage may be a diverse mix of organic and inorganic substances, either soluble or insoluble, for example runoff contaminated with salt used over winter to de-ice roads and footpaths and any other material deposited, accidentally or otherwise, onto roads or hard standing. Any spillages during operation, such as fuel or oil leakages from vehicles and machinery, could result in pollution of the watercourses. Such pollutants could reduce the diversity and quality of freshwater invertebrate communities through affecting respiration, feeding and reproduction. This impact may be present as part of baseline conditions due to the existing A9, but a precautionary approach has been applied whereby this is assessed as being of low negative magnitude.
- 10.4.72 Hydrological change, as a result of additional discharge received from road drainage may affect freshwater invertebrates. Many species of invertebrates are adapted to different flow speeds and occupy habitats of a certain flow type. Those which cannot tolerate faster flows may be lost or may be marginalised to slower flowing areas in the watercourse, increasing competition for food and habitat. Faster flows could also alter the habitat types present within the channels, for example by

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

scouring out smaller particle sizes and macrophytes. This could change the amount and types of refuges available to invertebrates and thus the invertebrate community composition. Habitat fragmentation through the extension of culverts would also occur. These potential impacts are assessed as being of low negative magnitude.

Macrophytes

Construction

- 10.4.73 Loss of macrophytes would be likely to occur during modifications/extension of existing culverts on Shochie Burn and Ordie Burn (lower), and construction of headwalls on Shochie, Ordie and Garry burns as well as a new bridge on upper Ordie Burn. The potential impacts are assessed as being of low negative magnitude.
- 10.4.74 Habitat loss would occur during construction activities associated with culvert extension/insertion and installation of headwalls and the new bridge. The potential impact is assessed as being of low negative magnitude.
- 10.4.75 Pollutants (including silt) may enter the watercourse from accidental spillages and in channel works and surface runoff affecting macrophyte communities. This could affect all watercourses; the potential impact is assessed as being of medium negative magnitude.
- 10.4.76 Construction activities such as dewatering have the potential to alter the hydrological condition of the watercourse affecting macrophyte communities. This may affect the Shochie Burn and Ordie Burn (lower) sites. Scour of macrophytes or loss of flow sensitive species in all watercourses from increased discharge over bare ground of construction site would occur. The potential impacts are assessed as being of low negative magnitude.
- 10.4.77 There is a potential for the spread of non-native plant species along watercourses during construction, through disturbance to plants and seeds which could affect native macrophyte communities. In the absence of mitigation to avoid transfer, this could affect the Shochie Burn and Ordie Burn (upper and lower) sites; the potential impacts are assessed as being of low negative magnitude.

Operation

- 10.4.78 Direct habitat loss would occur where culverts and headwalls are installed and under the new Ordie bridge, due to increased shading and loss of river bed. This would occur at Shochie Burn, Ordie Burn (upper and lower) and Garry Burn with the potential impact assessed as being of low negative magnitude.
- 10.4.79 During operation road drainage and surface runoff containing pollutants and sediment would enter all four watercourses surveyed; the potential impacts are assessed as being of low negative magnitude. Current A9 road drainage may reach these watercourse but locations at which this occurs are not known.
- 10.4.80 Hydrological variation during operation may occur where additional surface water drainage is entering the watercourse, or around new or extended structures. The potential impacts are assessed as being of low negative magnitude.

Ponds

Construction

- 10.4.81 Ponds 8 and 9 will be lost as part of the proposed scheme; this is assessed as being of high negative magnitude. Pollution from accidental spillages, construction works and runoff has the potential to affect pond 4, which has been assessed as low negative magnitude.

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

Operation

- 10.4.82 As noted above, habitat at ponds 8 and 9 would be lost under the footprint of the proposed scheme. This potential impact is assessed as being of high negative magnitude.

Freshwater Fish

Construction

- 10.4.83 Dewatering and bed removal for culvert and headwall construction could result in direct fish mortality. This potential impact is assessed as being of low negative magnitude.
- 10.4.84 Habitat loss would result from removal of river habitat. Fish utilise both channel substrates and bankside cover, and the loss of either of these has the potential to affect fish feeding and refuges. Habitats surrounding existing culverts are likely to be sub-optimal for key life stages of salmonid and coarse fish and therefore the extension of these structures is not expected to result in the loss of key, in channel, fish habitats. The reprofiling of banks, including the removal of marginal and riparian vegetation may reduce in-stream cover for fish species. This potential impact is assessed as being of low negative magnitude.
- 10.4.85 Temporary habitat fragmentation may result from hydrological change, reducing connectivity between habitats. Both salmonids and eels undertake migrations between marine and headwater environments, whilst coarse fish are known to move between different habitat types to fulfil different stages of their life cycle. This potential impact is assessed as being of low negative magnitude.
- 10.4.86 An increase in sediment can smother substrates and reduce the amount of spawning habitat present for a number of fish species, particularly salmonids. If sediments remain suspended they can prevent the successful development of fish eggs and larvae, reduce respiration and feeding success. This potential impact is assessed as being of low negative magnitude.
- 10.4.87 Accidental pollution release can occur during the construction phase (e.g. fuel and oil from plant, concrete and fine sediment release). Fish are particularly sensitive to soluble inorganic pollution with mortality observed at relatively low levels of soluble metal salts, whilst the organic constituents of runoff may include other contaminants which can result in deleterious effects on fish. Fish may avoid contaminated areas, thereby reducing available habitat area and reduced feeding and growth rates. This potential impact is assessed as being of low negative magnitude.
- 10.4.88 Hydrological conditions may be affected by channel dewatering or over-pumping reducing connectivity between habitats. Hydrological change could lead to a shift in the sediment patterns, for example with the loss of finer sediments such as silts and gravels with a higher flow. If silt is washed out of gravels, spawning habitat could be gained, however, if flows are significant, optimum fish habitats could be lost resulting in either suboptimum habitat use or fish not utilising the area at all. This potential impact is assessed as being of low negative magnitude.
- 10.4.89 Noise (vibration) occurring during construction has the potential to create a deterrent to fish species, preventing or delaying migrating species through watercourses of the proposed scheme. During the construction phase of the project, earthworks and culvert construction, works such as drilling, excavation and piling activities, carried out in the vicinity of the riverbank, will generate ground-borne vibrations that may propagate into the water column. Depending on the frequency, content and levels of noise reaching the water, this may have the potential to effect sensitive species and at various life stages (Richardson et al., 1995; Hawkins & Johnstone, 1978). This potential impact is assessed as being of low negative magnitude.

Operation

- 10.4.90 Habitat loss and fragmentation would occur as a result of the extension of existing culverts on Shochie and Ordie burns. Shading in culverts may slow or prevent fish movements due to predator

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

avoidance and the culvert structure may alter water velocities. Reduced water depth may cause a physical barrier to migration. This potential impact is assessed as being of low negative magnitude.

10.4.91 Pollutants contained within surface water runoff may reach watercourses if not removed by the SUDS drainage system (refer to Chapter 9: Road Drainage and the Water Environment). Routine maintenance of the drainage system during operation of the proposed scheme could also lead to the flushing of contaminants into the channels. Any spillages during operation, such as fuel or oil leakages from vehicles and machinery, could result in pollution of the watercourses. The overall potential impact is assessed as being of low negative magnitude.

10.4.92 Changes in the hydrology of the watercourses are possible where culverts have been inserted or extended. It is unlikely that the culverts under the proposed scheme would increase flow velocities above natural velocities found elsewhere on each tributary, although local effects may be observed. This potential impact is assessed as being of low negative magnitude.

10.5 Mitigation

Introduction

10.5.1 This section outlines mitigation measures proposed to avoid, reduce or offset the adverse effects of the proposed scheme in accordance with best practice guidance and UK, Scottish and local government environmental impact, planning and sustainability policies.

10.5.2 The principles and objectives for mitigation associated with the proposed scheme have been developed through an iterative process with the Jacobs design team and discussion with SNH, SEPA and other relevant stakeholders (Chapter 6: Consultation and Scoping).

10.5.3 As noted in Section 10.2 (Approach and Methods), proposed mitigation will follow a hierarchical approach to be adopted, where possible, in the following order (IEEM 2006; SNH 2009; Scottish Government, 2011):

- avoid adverse impacts in the first instance;
- where avoidance is not possible, reduce the adverse impacts; and
- where significant adverse residual impacts remain, measures to offset the adverse impacts at a site-specific level may be required.

10.5.4 It is considered that successful implementation of the proposed mitigation commitments would also ensure that there would be no adverse effects on the conservation objectives or integrity of the River Tay SAC (Jacobs, 2014). These measures are addressed in detail within the HRA.

Species Management Plans

10.5.5 Species Management Plans will be prepared for European Protected Species (including otter) by the contractor as part of an Environmental Management Plan (EMP) developed from the environmental commitments identified in this ES (Table 10.9) (**Mitigation Item E1**). The Species Management Plans will be prepared to ensure that essential mitigation strategies required for safeguarding protected species are implemented as part of the contract, and will be updated as appropriate if any additional licences and mitigation measures or amendments to the agreed mitigation are identified as a result of changes to the Stage 3 design or results of further surveys.

Ecological Clerk of Works

10.5.6 An ECoW will be employed by the contractor (**Mitigation Item E2**) to oversee the implementation of the proposed mitigation.

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

Mitigation

- 10.5.7 Generic mitigation measures required during construction and operation have been identified (**Mitigation Items E3 to E34**). The proposed scheme design also includes further specific mitigation (**Mitigation Items E35 to E55**), comprising a combination of targeted measures for particular species (such as otter-proof fencing), and requirements incorporated into the design; known as 'embedded mitigation' (such as overbridges and dry mammal underpasses).
- 10.5.8 For aquatic/river habitat, freshwater invertebrates and macrophytes, and for ponds, it was assessed that the generic mitigation measures described in Appendix A10.6 (Terrestrial and Freshwater Ecology – Impacts and Mitigation) and summarised below, would be sufficient to mitigate for all potential impacts of the proposed scheme.
- 10.5.9 Mitigation is described in the following text, with additional information provided in Appendix A10.6. Specific mitigation such as fencing and planting are also shown on Figure 11.2 (Landscape and Ecology Mitigation).

Generic Mitigation

- 10.5.10 Generic mitigation measures that apply to all ecological receptors across the proposed scheme are outlined in full in Appendix A10.6 and include the following examples:
- production of environmental management and invasive non-native species plans;
 - an ecological clerk of works (ECoW) will be present on site to monitor construction works;
 - pre-construction surveys will be undertaken as appropriate prior to commencement of project works in order to identify sensitive sites, vulnerable and invasive species;
 - vegetation clearance will be undertaken outside sensitive periods for birds, red squirrels and other species where practicable;
 - tree felling will be carried out by experienced contractors according to agreed felling methods and any licensing conditions as necessary;
 - plant and personnel will be constrained to a prescribed working corridor through the use of temporary barriers, thereby minimising damage to habitats and potential direct mortality and disturbance to species;
 - works compounds, storage sites and access roads will avoid, as far as possible, areas of woodland, wetland and scrub to prevent degradation of habitat, and from known animal resting sites;
 - where loss or degradation of valuable habitat is unavoidable and where watercourses are realigned, they will be returned, where possible, to their former quality or improved once construction is complete;
 - reducing in-channel works and translocating channel substrate (where in-channel works are required);
 - adherence to best practice guidance with respect to culvert, SUDS and catchpit design;
 - adherence to best working practices in relation to works within salmonid watercourses; and
 - any trenches dug during construction will be covered or fenced, or mammal ramps will be positioned in such a way that trapped mammals may escape.

Specific Mitigation

- 10.5.11 As noted above, the proposed scheme design includes a range of specific mitigation measures are proposed to avoid or reduce potential impacts at specific locations throughout the proposed scheme, as summarised below.

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

- 10.5.12 With respect to the provision of fencing, it should be noted that the locations shown on Figure 11.2 are indicative only at this stage. The new overbridge at Ordie Burn and farm accommodation bridges at Pitlandie and Coltrannie are not considered to be essential to function as mitigation for ecological receptors. However, these features would be available for use by animals; for example, commuting bats at Coltrannie may use the new bridge in this location to cross the proposed scheme.
- 10.5.13 During development of the proposed scheme design it was identified that the Gelly Overbridge would allow the two areas of commercial forestry on both sides of the A9 to be connected and may therefore potentially be used by pine marten and, as a result, reduce habitat fragmentation and risk of mortality (due to both the existing A9 and the proposed scheme). The enhanced design of the Gelly Overbridge as part of the proposed scheme includes a widened green verge that may also enable its use by other species such as otter, deer and red squirrel, and may lead to a wider biodiversity enhancement. Should the wildcat range extend into the study area in the future, the Gelly Overbridge would also be available for this species.

Mitigation for Protected Species

- 10.5.14 Proposed mitigation relevant for inclusion in Species Management Plans is indicated in Table 10.9 below for each protected species.

Table 10.9: Environmental Mitigation for Protected Species

Receptor	Generic Mitigation (E3 to E34)	Specific Mitigation (E35 to E55)
Bats	E3, E4, E7, E8, E12, E17, E19, E21, E23, E26, E28, E30	E35, E36, E37, E38, E44, E45, E55
Pine marten	E3, E4, E7, E12, E21, E23, E26, E30, E33	E50, E51
Red squirrel	E3, E4, E5, E7, E8, E12, E21, E23, E26, E30	E40, E41, E42, E50
Wildcat	E3, E4, E7, E12, E21, E23, E26, E30	n/a
Otter	n/a	E50, E52
Fish (Atlantic salmon & lamprey)	E3, E4, E7, E11, E12, E13, E21, E22, E30, E31, E32, E33	n/a

- 10.5.15 It will be the contractual responsibility of the appointed contractor to ensure that mitigation is implemented during the works and that all relevant licences are in place prior to commencement of works.

Terrestrial Habitats

- 10.5.16 Habitat loss (Table 10.8) as a result of the operation of the proposed scheme will be mitigated by the planting of replacement habitat such as species-rich grassland, woodland and scrub at various locations across the proposed scheme (Table 10.10). The planting strategy for biodiversity has been developed in conjunction with the Landscape team to ensure synergy for the mitigation planting requirements of both disciplines. This has been incorporated within the landscape proposals described in Chapter 11 (Landscape) and shown on Figure 11.2.

Table 10.10: Type and Approximate Habitat Replacement Planting within the CPO

Habitat Type	Approximate Habitat Amount (ha)
Deciduous Woodland	0.81
Mixed Woodland	6.39
New Pond	0.11
Rough Grassland	19.79
Shrub/Scrub Planting	4.10
Total	31.19

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

Terrestrial Invertebrates

- 10.5.17 Habitat loss as a result of the operation of the proposed scheme will be mitigated by the planting of species-rich grassland, woodland and scrub at various locations across the proposed scheme (refer to Figure 11.2). In addition, the creation of a new SUDS pond near to Bankfoot Junction is likely to provide additional habitat.

Bats

- 10.5.18 Planting incorporated within the landscape proposals described in Chapter 11 (Landscape) and shown on Figure 11.2 will provide connectivity opportunities for bats where possible.
- 10.5.19 To mitigate fragmentation of habitat during construction at Shochie Burn, Ordie Burn, Newmill, Westwood, Gary Burn, Coltrannie/Cairnleith, Muir of Thorn, Gelly Wood and Byres of Murthly/Mill Dam bat boxes will be erected and vegetation clearance minimised as far as practicable. The provision of bat boxes as replacement roosting habitat in nearby trees will mitigate potential loss of existing roost sites or potential roost sites. Cognisance will be taken of construction activities in proximity to mitigation sites prior to erection of bat boxes.
- 10.5.20 Habitat loss and fragmentation due to operation will be mitigated through the provision of bat boxes at Shochie Burn, Ordie Burn and in broadleaved semi-natural woodland north of the Coltrannie Overbridge, on the east side of the A9. There will also linear planting of hedgerows and standard trees at Newmill, to enable bats to travel between safe crossing points. The existing heights of culverts at Shochie and Ordie burns will be maintained to ensure that there is no significant change from current conditions and that the permeability of the road remains unchanged. It has been demonstrated that maintenance of existing culvert height is more important for bat use than changes in length (Boonman, 2011).

Breeding Birds

- 10.5.21 Habitat loss will be mitigated through appropriate habitat planting in each of the six quadrats (Figure 11.2). An appropriate buffer zone, determined in consultation with SNH, will be identified during the osprey breeding season (March to July inclusive) and reviewed in the context of any potential for works within this buffer zone, to avoid disturbance.

Reptiles

- 10.5.22 During construction, habitat to be lost in areas where reptiles have been found to be present will be stripped of vegetation in stages. The vegetation cover will be removed by strimming, with the first round reducing the vegetation by half its height. A second round will take place no less than 24 hours later reducing the vegetation height by half again. The soil will be stripped under supervision of an ECoW the following day.
- 10.5.23 A drystone wall is proposed to replace existing walls removed to facilitate building of additional carriageway. Drystone walls can be vital to the ecology of reptiles as they are often used as sites for shelter and hibernation. The wall will face approximately south east, getting full sun from late morning until sunset, for the most part. The wall will tie into the SUDS pond located next to the Gelly Burn (Figure 11.2). The proximity of the burn and the SUDS pond will support colonisation by invertebrates and in turn increase insect diversity providing increased feeding opportunities. The provision of scrub/shrub planting in this area will provide shelter whilst the species rich grassland will provide further foraging habitat and compensate for habitat lost to the new section of road in this area.
- 10.5.24 The Stage 3 design of the proposed scheme mainline does not include kerbs, and this will facilitate exit of any reptiles from the carriageway, mitigating potential direct mortality during operation of the proposed scheme. Planting of a grass verge will also provide habitat for reptiles to both bask and forage in, particularly where located adjacent to existing reptile habitats. The provision of grass verges from the top of the proposed scheme down to the north of Bankfoot may also serve as a

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

corridor to facilitate dispersal of reptiles between suitable habitats, in turn facilitating genetic flow and expansion of the reptile population.

Pine Marten

10.5.25 The provision of an overbridge to maintain access between the east and west side of the carriageway at Gelly will provide a crossing point for pine marten. Mixed woodland planting is proposed on both sides of the carriageway at the overbridge location. This will increase the likelihood of pine martens using the bridge whilst providing habitat to compensate for the loss of woodland to make way for the additional carriageway.

10.5.26 The provision of grass verges and mixed woodland will also provide additional foraging habitat for small mammals, birds, fruit and invertebrates.

Red Squirrel

10.5.27 If dreys are found during preconstruction surveys of trees requiring removal, a licence will need sought from SNH to legally allow tree felling and the subsequent destruction of dreys to take place.

10.5.28 The provision of an overbridge to maintain access between the east and west side of the carriageway at Gelly will provide a crossing point for red squirrel.

Otter

10.5.29 As shown on Figure 11.2, otter proof fencing will be provided for 150m at Shochie Burn, Ordie Burn, Corral Burn un-named tributary, Ardonachie Burn, Broomhill Burn and Gelly Burn (north) i.e. where the road crosses a watercourse where evidence of otter activity was confirmed or where the watercourse provides connectivity to important habitat. This will protect otters from direct mortality on the road.

10.5.30 The extensions to existing culverts are not anticipated to significantly alter their use or permeability to otters. However, dry mammal underpasses (DMU) will also be provided at Shochie Burn culvert, Ordie Burn culvert, Ardonachie Burn culvert and at ch9120 (subject to approval by SEPA) to increase the permeability of the road and to mitigate for potential habitat fragmentation. The new overbridge with enhanced design at Gelly Wood may also be used to safely cross the carriageway.

Amphibians

10.5.31 Proposed planting around SUDS ponds, the main highway and slip-roads will create new terrestrial habitat. Creation of a new SUDS pond at Bankfoot (east) will create new breeding habitat. This pond will also create new habitat for freshwater invertebrates and macrophytes.

Deer

10.5.32 Any existing deer fencing removed as a result of construction of the proposed scheme will be repaired or replaced. As explained in Chapter 11 (Landscape), the contractor will also be required to undertake a deer collision risk assessment, and implement any fencing identified as required through this process.

Freshwater Fish

10.5.33 Culvert design will take cognisance of the available best practice documents (Scottish Government, 2010). This will specify culvert modification and design parameters to sensitively protect ecological interests such as migratory pathways.

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

Monitoring

- 10.5.34 Monitoring will be undertaken to confirm efficacy of certain aspects of mitigation proposed (Appendix A10.6). These areas will include:
- bat and otter crossing points (such as culverts) (refer to **Mitigation Item E17**);
 - replacement roost sites (bat boxes) (refer to **Mitigation Item E44**); and
 - new areas of habitat (refer to **Mitigation Item E25**).
- 10.5.35 The monitoring strategies will be developed in consultation with SNH in line with IEEM (2006) and DMRB guidance. The aim of the monitoring will be to confirm the lack of significant residual impact. The monitoring will enable lessons learnt from mitigation effectiveness to be included in future Transport Scotland projects and potential changes in the post construction highways management to address any significant issues if identified.

10.6 Residual Impacts

- 10.6.1 Potential impacts of negligible significance are anticipated to be fully mitigated by the implementation of generic mitigation measures, including adherence to environmental and species management plans, and the application of best practice and good construction guidelines.
- 10.6.2 For remaining potential impacts identified, there are no significant residual impacts on receptors following successful implementation of proposed mitigation measures. Further details are provided below.

Designated Sites

- 10.6.3 With the implementation of the required mitigation for these receptors through an Environmental Management Plan, including pollution prevention measures, there are no predicted significant residual impacts on Cairnleith Moss SSSI.
- 10.6.4 With the implementation of an Environmental Management Plan, including pollution prevention measures and SUDS, and mitigation to protect otters, salmon and lamprey as detailed in the HRA (and indicated below), there are no predicted significant residual impacts on the River Tay SAC.

Terrestrial Habitats

- 10.6.5 Through the minimisation of land-take, implementation of invasive non-native species management plan and the replacement of habitat by the creation of woodland, scrub and grassland areas, no significant residual impacts are predicted.

Terrestrial Species

- 10.6.6 Implementation of the required mitigation for these receptors through species management plans and method statements including the protection of resting sites (or the licensing of any activities which might affect them, which may necessitate the creation of new resting sites), protection measures (such as provision of mammal-proof fencing) and the provision of and new habitat areas (woodland, scrub and grassland), will result in no significant residual impacts.
- 10.6.7 The provision of bat boxes as alternative roost sites, linear planting of hedgerows and trees will also ensure there are no significant residual impacts on this receptor.
- 10.6.8 For breeding birds, the avoidance of breeding periods for vegetation will additionally ensure there are no predicted significant residual impacts on this receptor.
- 10.6.9 For otter, the provision of dedicated crossing points or safeguarding of existing commuting routes and the provision of mammal proof fencing will additionally ensure there are no predicted

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

significant residual impacts on this receptor. The culvert extensions will not affect the existing permeability of the road if taken individually and therefore there will not have a significant effect on otter. In combination there may be a slight increase in the likelihood of effect. However, as DMU are provided at important watercourses to the southern end of the proposed scheme (Shochie and Ordie burns), at Ardonachie Burn in the middle of the proposed scheme (ch5710) and the Gelly Overbridge at the northern end of the proposed scheme at ch9120, the permeability of the road will be maintained.

- 10.6.10 For reptiles, the proposed scheme design does not include kerbs on the mainline (which can act as barriers to movement), and the additional provision of alternative habitat (including drystone walls) will ensure there are no predicted significant residual impacts on this receptor.
- 10.6.11 Pre-construction red squirrel surveys for dreys and the creation of woodland with an appropriate species mix will ensure there are no predicted significant residual impacts on this receptor.
- 10.6.12 For amphibians, the drainage of existing ponds outwith the breeding period, translocation of individuals and the construction of new pond habitat will additionally ensure there are no predicted significant residual impacts on this receptor.

Aquatic Habitat and Freshwater Species

- 10.6.13 With the implementation of the required mitigation for these receptors through pollution prevention measures (including SUDS) and the use of best practice construction techniques, including guidance on culvert design, construction techniques and river restoration, there are no predicted significant residual impacts. In addition, creation of a new pond at Bankfoot North Junction will avoid significant residual impacts as a result of the loss of pond habitat.

10.7 References

Aktins (2009). A9 Dualling Luncarty to Pass of Birnam. Stage 2 Environmental Assessment. Volume 1: Report. February 2009. Report to Transport Scotland.

APEM (2002). Distribution of Sea, Brook and River Lampreys on the River Tay. Scottish Natural Heritage Commissioned Report F01AC610.

APEM (2004). Distribution of sea, brook and river lampreys on the River Tay. Scottish Natural Heritage Commissioned Report No. 032 (ROAME No. F01AC610).

Bat Conservation Trust (2012). Bat surveys - Good practice guidelines, 2nd Edition. Bat Conservation Trust, London.

Boonman, M. (2011). Factors determining the use of culverts underneath highways and railway tracks by bats in lowland areas. *Lutra* 53 (1): 3-16.

Brassey, R., MacKenzie, I. and Tonkin, M. (2012). Results of spring 2012 red and grey squirrel surveys. Saving Scotland's Red Squirrels, Scottish Wildlife Trust, Edinburgh.

Cheffings, C.M. and Farrell, L. (Eds), Dines, T.D., Jones, R.A., Leach, S.J., McKean, D.R., Pearman, D.A., Preston, C.D., Rumsey, F.J., Taylor, I. (2005). The Vascular Plant Red Data List for Great Britain. Species Status 7: 1-116. Joint Nature Conservation Committee, Peterborough.

Croose, E., Birks, J.D.S. and Schofield, H.W. (2013). Expansion zone survey of pine marten (*Martes martes*) distribution in Scotland. Scottish Natural Heritage Commissioned Report No. 520.

Davis, A.R. and Gray, D. (2010). *The distribution of Scottish wildcats (Felis silvestris) in Scotland (2006-2008)*. Scottish Natural Heritage Commissioned Report No. 360.

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

European Commission (1992). Council Directive (92/43/EEC) Conservation of natural habitats and wild flora and fauna.

<http://www.eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31992L0043:EN:HTML>.

European Union (2009). Council Directive 2009/147/EC on the conservation of wild birds. <http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:020:0007:0025:EN:PDF>.

Halcrow (2013a). Habitat Regulations Appraisal – Screening Report (May 2013).

Halcrow (2013b). Strategic Environmental Assessment: Appendix D: Habitat Regulations Appropriate Assessment (draft, September 2013).

Hawkins, A. D., Johnstone, A, D, F., (1978). The hearing of Atlantic Salmon, *Salmo salar*. Journal of Fish Biology. 13, (6): 655-673.

Highways Agency et al. (1993a) Design Manual for Roads and Bridges, Volume 11, Section 3, Part 4. Ecology and Nature Conservation. The Highways Agency, Scottish Executive Development Department, The National Assembly for Wales and the Department of Regional Development Northern Ireland.

Highways Agency et al. (1993b). DMRB Volume 10 {Environmental Design}, Section 4, Parts 1-4, 6-7. Highways Agency, Scottish Executive Development Department, The National Assembly for Wales and the Department of Regional Development Northern Ireland.

Institute of Ecology and Environmental Management (2006). Guidelines for Ecological Impact Assessment in the United Kingdom.

Institute of Ecology and Environmental Management (2008). Sources of Survey Methods. <http://www.cieem.net/sources-of-survey-methods-sosm->.

Iuell et al. (2003), Wildlife and traffic: a European handbook for identifying conflicts and designing solutions. Iuell, B., Bekker, G. J., Cuperus, R., Dufek, J., Fry, G., Hicks, C., Hlaváč, V., Keller, V. B., Rosell, C., Sangwine, T., Tørsløv, N., Wandall, B. and le Maire, B. (red.) (2003). COST 341. KNNV Publishers.

Jacobs et al. (2007). Strategic Transport Projects Review, Report 4, Appendix D – Environment. Jacobs, Faber Maunsell and AECOM. Report to Transport Scotland.

Jacobs (2014) A9 Dualling: Luncarty to Pass of Birnam - Habitats Regulations Appraisal, River Tay SAC.

Joint Nature Conservation Committee (2013a). River Tay (website). <http://jncc.defra.gov.uk/protectedsites/sacselection/sac.asp?EUCode=UK0030312>.

Joint Nature Conservation Committee (2013b). Turflundie Wood (website). <http://jncc.defra.gov.uk/protectedsites/sacselection/sac.asp?EUCode=UK0030240>.

Kruuk, H. (1995). Wild Otters, Predation and Populations. Oxford University Press, Oxford.

National Biodiversity Network (2013). National Biodiversity Network's Gateway. <http://data.nbn.org.uk/>.

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

Ratcliffe, D.A., (1977). *A Nature Conservation Review*, Volumes 1 & 2. University Press, Cambridge.

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

Richardson et al. (1995). Marine Mammals and Noise. Richardson, W.J., Greene, jr., C.R.G., Malme, C.I. & Thomson, D.H. (1995). Academic Press, San Diego.

Rodwell, J.S. (ed.) (1992). British Plant Communities Vol. 3. Grasslands and montane communities. Cambridge University Press, Cambridge.

Rodwell, J.S. (ed.) (1995). British Plant Communities Vol 4. Aquatic communities, swamps and tall-herb fens. Cambridge University Press, Cambridge.

Rodwell, J.S. (ed.) (2000). British Plant Communities Vol 5. Maritime communities and vegetation of open habitats. Cambridge University Press, Cambridge.

Scottish Biodiversity List. (2013). <http://www.scotland.gov.uk/Topics/Environment/Wildlife-Habitats/16118/Biodiversitylist/SBL>.

Scottish Government (2010). WAT-SG-25: Engineering in the water environment: good practice guide, River crossings. Second edition, November 2010.

Scottish Government (2011) The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011 (as amended). <http://www.legislation.gov.uk/ssi/2011/139/contents/made>.

SNH (2007). Cairnleith Moss Site of Special Scientific Interest Citation. http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=289.

SNH (2009). 3rd edition A Handbook on Environmental Impact Assessment. http://www.snh.org.uk/ww/sharinggoodpractice/eia_home.asp.

SNH (2010a). Mill Dam Site of Special Scientific Interest Citation. http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=1153.

SNH (2010b). Mill Dam Site of Special Scientific Site Management Statement. http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=1153.

SNH (2013a). Site Details for River Tay, Site Condition. http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8366.

SNH (2013b). Site Details for Cairnleith Moss, Site Condition. http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=289.

SNH (2013c). Site Details for Mill Dam, Site Condition. http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=1153.

Strachan, R. (2007). National Survey of Otter *Lutra lutra* Distribution in Scotland 2003–04. SNH Commissioned Report No. 211 (ROAME No. F03AC309).

Surface Waters (Fishlife) (Classification) (Scotland) Amendment Regulations (2007). Scottish Statutory Instruments 178 2007. ISBN 9780110719696. The Stationery Office Limited.

Tayside Biodiversity Partnership (undated). Tayside Biodiversity 'The Variety of Life'. <http://www.taysidebiodiversity.co.uk/index.htm>

Tay District Fisheries Board (2009). Results of Juvenile Salmon Surveys at Long Term Monitoring Sites to 2009. Report to the Hay Foundation. Tay District Fisheries Board. <http://www.tdsfb.org/documents/TayTributariesElectrofishingSurveyReport.pdf>

The Vincent Wildlife Trust (VWT) (2013). Pine Martin Distribution and Status. <http://www.vwt.org.uk/species/pine-marten>.

A9 Dualling: Luncarty to Pass of Birnam

DMRB Stage 3 Environmental Statement

Chapter 10: Ecology and Nature Conservation

Transport Scotland (2008). Scottish Transport Appraisal Guidance (STAG) Environment Section. http://www.transportscotland.gov.uk/files/STAG_Technical_Database_Section_7_May_2008.pdf.

UK Biodiversity Action Plan. <http://www.ukbap.org>.

United Kingdom Biodiversity Steering Group Report (1995). Volume 2 Action Plans (Annex F and Annex G).

Watt, J., Ravenscroft, N.O.M. and Seed, M. (2008). Site Condition Monitoring of Lamprey in the River Tay Special Area of Conservation. SNH Commissioned Report No. 292 (ROAME No. R07AC606).

Weeds Act (1959) (as amended). HMSO, London.

Wildlife and Countryside Act (1981) (as amended). HMSO, London.

Wildlife and Natural Environment (Scotland) Act (2011). <http://www.legislation.gov.uk/asp/2011/6/contents>

Young, M. (2005). A literature review of the water quality requirements of the freshwater pearl mussel (*Margaritifera margaritifera*) and related freshwater bivalves. SNH Commissioned Report No. 084 (ROAME No. F01AC609d).