11 Ecology and Nature Conservation

This chapter considers the potential impacts of the proposed scheme on terrestrial and freshwater species, habitats and ecosystems. The approach to this assessment is based on Design Manual for Roads and Bridges (DMRB) guidance and draws on the Chartered Institute for Ecology and Environmental Management's (CIEEM) Guidelines for Ecological Impact Assessment in the UK and Ireland.

Baseline conditions for ecological features were established through the desk-based assessment, consultation and site surveys. This process identified a number of ecological features that could potentially be impacted by the proposed scheme. These included five designated sites: Moray Firth Special Area of Conservation (SAC), Inner Moray Firth Special Protection Area (SPA), Moray Firth proposed Special Protection Area (pSPA), Inner Moray Firth Wetland of International Importance (Ramsar) and Longman and Castle Bays Site of Special Scientific Interest (SSSI). In addition, aquatic and terrestrial species and habitats that could potentially be impacted included wintering birds, bats, breeding birds, barn owl, otter, badger, freshwater fish and macroinvertebrates.

Assessment of impacts and their significance took into account the nature and magnitude of potential impacts and their consequent effects on important ecological features. Prior to the application of mitigation, potential significant impacts on ecological features were identified for the construction and operation phases of the proposed scheme.

A hierarchical approach to mitigation was followed to address potential impacts. The primary approach has been to use the flexibility available within the early design stages to avoid significant impacts. An iterative design process has been undertaken and design principles have been discussed with Scottish Natural Heritage (SNH), Scottish Environment Protection Agency (SEPA), and other relevant stakeholders.

Where avoidance of impacts has not been possible, mitigation to reduce significant impacts has been identified. Measures include the implementation of commitments and best working practices during the construction phase of the proposed scheme. During operation, compensatory planting, habitat creation, mammal fencing and provision of crossing structures have been proposed to mitigate potential impacts.

A temporary significant negative residual impact is identified due to loss and fragmentation of woodland on bats and breeding birds; however, once landscape and ecological planting has established no residual impacts are predicted. A non-significant minor negative residual impact is predicted for freshwater fish due to mortality of fish during dewatering and instream works activities where required during construction.

No other significant residual impacts are anticipated from the construction or operation phases of the proposed scheme.

11.1 Introduction

11.1.1 This chapter presents the Design Manual for Roads and Bridges (DMRB) Stage 3 Ecological Impact Assessment (EcIA) for the proposed scheme (Chapter 4: The Proposed Scheme), which considers the potential impacts on terrestrial, marine and freshwater species, habitats and ecosystems.

11.1.2 The chapter is supported by the following appendices, which are cross referenced where relevant:

- Appendix A11.1 (Scientific Names);
- Appendix A11.2 (Baseline Data and Detailed Survey Methods); and
- Appendix A11.3 (Confidential Ecology Features).

11.1.3 Appendix A11.3 (Confidential Ecology Features) is not published with this Environmental Impact Assessment Report (EIAR) due to the potential risk to protected species from locational data being made publicly available. However, these data will be submitted to:

- Scottish Natural Heritage (SNH);
- Transport Scotland; and
- The Highland Council.

11.1.4 The chapter is supported by the following figures, which are cross referenced where relevant:

- Figure 11.1 (Ecological Designations)
- Figure 11.2 (Phase 1 Habitat Survey)
- Figure 11.3 (Confidential - Badger Survey Results)
- Figure 11.4 (Bat Roost Survey Results)
- Figure 11.5 (Bat Crossing Point Survey Results)
- Figure 11.6 (Bat Static Detector Survey Results)
- Figure 11.7 (Bird Survey Methods)
- Figure 11.8 (Key Farmland Breeding Birds)
- Figure 11.9 (Confidential - Schedule 1 Species)
- Figure 11.10 (Wintering Birds)
- Figure 11.11 (Confidential - Otter Survey Results)
- Figure 11.12 (Great Crested Newt Survey Results)
- Figure 11.13 (Aquatic Survey Results)

11.1.5 The assessment is derived from a review of available information including:

- the A9/A96 Inshes to Smithton DMRB Stage 2 Assessment and data (Jacobs 2017);
- site surveys (as detailed in Table 11.1);
- supplementary consultation to take into account design features of the preferred option selected during A9/A96 Inshes to Smithton DMRB Stage 2; and
- the A96 Inverness to Nairn (Including Nairn Bypass) Stage 2 and Stage 3 Assessments and data (Jacobs 2011, Jacobs 2014 and Jacobs 2016).

11.1.6 A Habitats Regulations Appraisal (HRA) for the proposed scheme has also been completed (Jacobs 2019) and is referred to within this assessment where relevant.

11.2 Methodology

11.2.1 The approach to this assessment is based on the guidance provided by:

- DMRB Volume 11, Section 3, Part 4: Ecology and Nature Conservation (Highways Agency, Scottish Government, Welsh Assembly Government and The Department of Regional Development Northern Ireland 1993);
- the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM 2018); and
- DMRB Interim Advice Note 130/10 'Ecology and Nature Conservation: Criteria for Impact Assessment' (Highways Agency, Scottish Government, Welsh Assembly Government and The Department of Regional Development Northern Ireland 2010) (hereafter referred to as IAN 130/10).

11.2.2 In addition to the above guidance, other policy documents and published guidance taken into account in the preparation of this chapter include:

- Scottish Transport Appraisal Guidance (STAG) (Transport Scotland 2015);
- Environmental Impact Assessment Handbook Version 4 (SNH 2014a);
- Environmental Impact Assessment Handbook Version 5 (SNH 2018a);
- Scottish Government's Planning for Natural Heritage: Planning Advice Note 60 (Scottish Executive 2000); and

- Scottish Government's Planning Advice Note 1/2013: Environmental Impact Assessment Revision 1.0 (Scottish Government 2017).

11.2.3 Additional policy and guidance documents are discussed in Chapter 18 (Policies and Plans).

Study Area

11.2.4 The study area comprised an area up to 500m from the proposed scheme as shown on Figure 11.1. Following consultation (Chapter 6: Consultation and Scoping) with consultees listed in paragraph 11.2.10 below, and in line with standard survey guidance for ecological features, some variations were made to the study area. Such variations were ecology feature-specific, according to their sensitivity, mobility and habitat, and are described in Table 11.1.

11.2.5 National Biodiversity Network (NBN) Atlas desk-based searches were undertaken up to 10km from the proposed scheme for the last 10 years, to take into account the highly mobile nature of some species and the level at which some data is available (10km grid square). Data relating to macroinvertebrates extended to the last 20 years, to take into account that macroinvertebrate data is collected less frequently than for other features. Detailed results of the desk searches are presented in Appendix A11.2 (Baseline Data and Detailed Survey Methods).

11.2.6 Where reference is made to the footprint of the proposed scheme, this denotes land permanently lost to the scheme for permanent works, and areas required for construction, operation and maintenance of the proposed scheme, as approximated from currently available information. Where reference is made to the online section of the proposed scheme, this refers to where the A9 Perth – Inverness Trunk Road will be widened with a proposed lane gain/lane drop arrangement between Raigmore Interchange and Inshes Junction. Where reference is made to the offline section of the proposed scheme, this refers to the section between the existing U1058 Caulfield Road North at the approach to the B9006 Culloden Road, and the proposed A96 Smithton Junction at its southern roundabout. This section would comprise a single carriageway length travelling in a north-east direction (Figure 11.1).

11.2.7 Following design refinement in April 2019 it was confirmed that lighting is to be installed along the A9 south of Inshes Overbridge, extending south of the draft CPO boundary for a length of approximately 624m. This area falls outwith the study area; however, desk study and professional judgement has been used to identify potential impacts on protected species from this design amendment.

Baseline Conditions

Desk-based Assessment

11.2.8 The desk-based assessment, undertaken in 2018 and 2019, consisted of a review of existing relevant literature and data, along with online searches for ecological information within the study area, including:

- A9/A96 Inshes to Smithton DMRB Stage 2 Scheme Assessment Report (Jacobs 2017);
- A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 3 Environmental Statement (Jacobs 2016);
- A96 Dualling Inverness to Nairn (including Nairn Bypass), DMRB Stage 2 Scheme Assessment Report (Jacobs 2014);
- A96 Dualling to Inverness Airport: DMRB Stage 2 Environmental Assessment Report (Atkins 2008);
- Scottish Environment Protection Agency (SEPA) Water Framework Directive (WFD) classifications (SEPA 2018a);
- Stratton Environmental Statement: Planning Application for urban expansion including a new town centre (WSP Energy and Environment 2009); and
- survey data from Scottish Badgers (received 2019) (Appendix A11.3: Confidential Ecology Features).

11.2.9 Information for the desk-based assessment was obtained from the following online resources:

- Joint Nature Conservation Committee (JNCC) website (JNCC 2018a);
- NBN Atlas (NBN 2018a; NBN 2018b; NBN 2019);
- Scotland's Environment website (Scotland's Environment Web Partnership 2018);
- SEPA website (SEPA 2018b); and
- SNH Information Service (SNH 2018b).

11.2.10 The following non-statutory consultees were contacted, and any data received from them also formed part of the desk-based assessment:

- Botanical Society of Britain and Ireland;
- British Trust for Ornithology (BTO);
- Highland Badger Network;
- Highland Biodiversity Partnership;
- Highland Biological Recording Group;
- Highland Red Squirrel Group;
- Inverness Bat Group;
- Marine Scotland;
- Ness and Beauly Fisheries Trust;
- North Highlands Bat Group;
- Royal Society for the Protection of Birds (RSPB);
- Scottish Badgers;
- Scottish Forestry;
- Scottish Wildcat Association;
- Scottish Wildlife Trust (SWT);
- Highland Raptor Study Group; and
- The Woodland Trust.

Site Surveys

11.2.11 Ecology surveys were undertaken as described in Table 11.1 below.

11.2.12 All surveys were undertaken between 2016 and 2018 and baseline results represent conditions at that time. Any limitations experienced during site surveys are detailed in Table 11.1.

Table 11.1: Details of Surveys Used to Inform the DMRB Stage 3 Assessment of Ecology and Nature Conservation

Survey Type	Guidance	Date Ranges	Survey Area Covered and Signs Recorded
Terrestrial Features			
Badger	Harris, Creswell and Jeffries 1989 SNH 2003 SNH 2014b SNH 2019b	October to November 2017 to coincide with a peak in badger territorial activity	Badger presence/likely absence and use of suitable habitats was recorded within the footprint of the proposed scheme and extended to a 250m buffer from the proposed scheme, except where land access constrained the survey extent (e.g. where land was adjacent to an active railway line). Surveyors recorded field signs indicative of badger where present. Signs which were searched for included: • setts as defined by the Protection of Badgers Act 1992; • structures that were possible setts, but that had no immediate evident signs of current use by badgers; and • hairs, prints, mammal paths and dung.
Bat: ground-based assessment	Collins 2016	December 2017 to February 2018	Detailed ground-based assessments were conducted to assess trees, buildings and structures for summer and hibernation roosting potential. Surveyors recorded field signs indicative of bats where present. Signs which were searched for included: • live or dead bats; • bat droppings; • urine splashes; • fur-oil staining; • feeding remains; and • squeaking noises. Surveys were undertaken within the footprint of the proposed scheme and extended to a 50m buffer from the online section of the proposed scheme adjacent to the A9 and extended to a 250m buffer from the offline section of the proposed scheme. Potential was categorised as negligible, low, moderate, high or confirmed roost in accordance with best practice guidance. This was used to inform the requirements for further survey work. All trees within the survey extent were assessed but trees with negligible potential were not recorded.
Bat: roost surveys	Collins 2016	Summer: May to August 2018	Buildings assessed during the ground-based assessment surveys as having moderate or high potential and within 30m of the proposed scheme were taken forward for further survey. One high potential building within 30m of the proposed scheme was surveyed once in May 2018 as only low impact works are predicted to be undertaken within 30m and it is considered that any roosts within this building will be identified on further surveys at pre-construction. No structures with moderate or high potential were present within 30m of the proposed scheme. One moderate potential building within 100m of the offline section of the proposed scheme had one dusk emergence and one dawn re-entry survey between July and August 2018. These surveys were undertaken as the building is the closest property to the offline section of the proposed scheme which will see construction of a new road in currently agricultural habitat. No further surveys were undertaken on trees beyond the ground-based assessment. Surveys and bat call analysis were carried out using standard call detection and recording equipment. Detailed methods are presented in Appendix A11.2 (Baseline Data and Detailed Survey Methods).
Bat: crossing point surveys	Berthinussen and Altringham 2015	May to August 2018	Survey methods were adapted from Berthinussen and Altringham (2015) with the aim of determining the height and frequency at which bats were crossing the proposed scheme. Crossing point surveys were carried out at any significant habitat feature, such as tree lines, hedgerows or watercourses, that would be severed by the offline section of the proposed scheme. Three dusk and/or dawn surveys were undertaken at each location in spring (May 2018), summer (June/July 2018) and late summer (August 2018). Bat activity was recorded in terms of whether the bat crossed the

Survey Type	Guidance	Date Ranges	Survey Area Covered and Signs Recorded
			location of the proposed scheme, the height band at which it crossed relative to the ground surface (A: 0 to 2m above ground level; B: 2 to 5m above ground level; and C: more than 5m above ground level) and the direction from which it travelled. It was interpreted that bats flying from 2m to 5m would be at risk of collision from Heavy Goods Vehicles (HGVs) as the maximum height for HGVs in the UK is 4.95m (The Road Vehicle (Construction and Use) Regulations 1986) and bats flying below 2m would be at risk from collision with both cars and HGVs. Surveyors recorded all bats which crossed the proposed scheme. General foraging activity was not recorded, except for noting the first bat of each species and providing a summary of foraging activity levels at the end of the survey. Crossing point data were analysed to establish the flight height and frequency of bats using the different features. Surveys and bat call analysis were carried out using standard call detection and recording equipment. Detailed methods are presented in Appendix A11.2 (Baseline Data and Detailed Survey Methods).
Bat: static detector surveys	Collins, 2016 Wray, Wells, Long and Mitchell-Jones 2010	May to August 2018	To complement crossing point surveys, static detectors were placed at the same locations for at least seven consecutive nights in May, June/July and August 2018 to provide at least 21 days of data at each crossing point location. Data from the static detectors were used to establish the intensity of bat use at each feature and identify any peaks in bat activity across different times and seasons. To assess activity levels at a regional level, the results of the acoustic monitoring were entered into the Ecobat database, an online tool run by the Mammal Society for the standardised, rigorous interpretation of bat activity data. The Ecobat database compiles observations of bat activity (bat passes) at a national level which is compared to bat activity recorded at a focal site and contextualised against reference levels. The 'reference range' is a stratified dataset by which percentile outputs are generated and the percentiles provide a numerical indicator of the relative importance of a night's worth of bat activity. Assigning a relative importance to each recording location allows them to be compared and identify those that are of higher value for the impact assessment. This is described in detail in Appendix A11.2 (Baseline Data and Detailed Survey Methods). To define activity levels on a local level (within the study area), the analysed data was used to produce an index of bat activity (bat passes per night) and the number of species recorded (species diversity) at each location. Species which were treated as rare or rarer (Wray, Wells, Long and Mitchell-Jones 2010) were also identified. These results were transformed into an overall value (high, moderate or low) for each location for the study area. This is described in detail in Appendix A11.2 (Baseline Data and Detailed Survey Methods). In summary, the valuation was based on: • overall activity levels (for all species), as those areas supporting larger numbers of foraging or commuting bats would be deemed most valuable; • species richness, as those supporting a higher number of species of bats would be deemed most valuable; and • presence of rare or rarer species. The overall value at a local level was calculated by assigning points to each of these three variables and summing the total. Assigning an overall value to each recording location enables a comparison between sites surveyed and allows for mitigation to be designed to target the most important impact locations. Surveys and bat call analysis were carried out using standard call detection and recording equipment. Detailed methods are presented in Appendix A11.2 (Baseline Data and Detailed Survey Methods).
Breeding birds	Bibby, Burgess, Hill and Mustoe 2000	April to July 2018	Surveys were undertaken within the footprint of the proposed scheme and extended to a 250m buffer of the proposed scheme to identify the breeding bird assemblage present. The surveys were undertaken over four consecutive days each month between April and July 2018 (inclusive) and were conducted between sunrise and midday, and only during favourable weather conditions (no heavy rain, poor visibility or strong winds). Breeding waders and Schedule 1 species were identified out to a 500m buffer from the proposed scheme following the same methods as above.

Survey Type	Guidance	Date Ranges	Survey Area Covered and Signs Recorded
Barn owl	Hardey, Crick, Wernham, Riley, Etheridge and Thompson 2013 Shawyer 2011	April to July 2018	Specific barn owl surveys were undertaken within the footprint of the proposed scheme and extended up to a 500m buffer from the proposed scheme to identify potential nest sites. Surveyors recorded field signs or habitat indicative of barn owl where present. Signs which were searched for included: • barns suitable for barn owl; • hollow cavities in trees suitable for barn owl; and • barn owl nest boxes. Surveyors also used data from incidental records of barn owl during other surveys to identify potential nest site locations. Barn owl surveys, including direct nest inspections, were undertaken following best practice guidance by a Schedule 1 licensed ornithologist (Licence number: 95126).
Wintering birds	Keller, Gallo-Orsi, Patterson and Naef-Daenzer 1997 Patterson, Lambie, Smith and Smith 2013	October 2017 to March 2018	Surveys were undertaken in winter 2017/18 between October 2017 and March 2018 (inclusive) to identify: • overnight goose roosts within 500m of the proposed scheme; • inland foraging and diurnal high tide roosts on high tide periods; and • foraging, loafing, diurnal high tide roosting and overnight roosting presence of waders and wildfowl up to 5km from the proposed scheme. Surveys to identify overnight goose roosts within the footprint of the proposed scheme and to a 500m of the proposed scheme were undertaken over three consecutive days each month. Surveys were conducted at dusk and dawn. Dawn surveys commenced 30 minutes prior to civil dawn (when the geometric centre of the sun is 6° below the horizon in the morning) for 1.5 hours and dusk surveys began 1.5 hours prior, to 30 minutes after, civil dusk (when the geometric centre of the sun is 6° below the horizon in the evening). Two dawns and two dusk surveys were undertaken in each month from three separate Vantage Points (VPs) (Figure 11.7). Surveys on high tide periods to identify inland foraging and diurnal high tide roosts were undertaken during daylight hours which combined walkovers and multiple visits to the VP locations. Flight activity directly over the proposed scheme was also recorded to identify commuting routes. Surveys to identify foraging, loafing, diurnal high tide roosting and overnight roosting presence of waders and wildfowl up to 5km from the proposed scheme were undertaken as drive-over surveys on one day each month. Two surveyors (one driving and one experienced ornithologist) drove along available roads within the study area while scanning for flocks of foraging waders and wildfowl, primarily geese. Upon observing waders and/or wildfowl, surveyors stopped in a safe location to record flock sizes and behaviour. Surveyors also stopped at locations that provided good views over wide areas of suitable habitat to observe for any birds which were not observed during the drive-by survey.
Otter	Chanin 2003	October to November 2017 May 2018	Otter presence/likely absence was assessed by surveying habitats affected by the proposed scheme. Surveys were conducted along watercourses within the footprint of the proposed scheme and extended from a minimum of 100m and to a maximum of 250m from the proposed scheme. Surveys extended to 50m from the water's edge. Nine suitable watercourses were surveyed (as identified during the DMRB Stage 2 Assessment of the proposed scheme) where habitats were considered to be valuable, in terms of having potential to support foraging and resting otter. Surveyors recorded field signs indicative of otter where present. Signs which were searched for included: • shelters (above ground couches and below ground holts); • spraints, prints, slides or other well-used access points to watercourses; • feeding remains; and • sightings (including Wildlife Vehicle Incidents (WVI)).

Survey Type	Guidance	Date Ranges	Survey Area Covered and Signs Recorded
			Further surveys were undertaken in May 2018 as autumn/winter 2017 was exceptionally cold and it was considered that mammal activity would be lower than usual. However, a prolonged dry spell prior to May 2018 meant that their activity may also have been reduced for these May surveys.
Water vole	Strachan, Moorhouse and Gelling 2011	October 2017 November 2017 May 2018	Water vole presence/absence was assessed by surveying habitats affected by the proposed scheme. Surveys were conducted along watercourses within the footprint of the proposed scheme and extended up to 100m from the proposed scheme and extended to 2m from the water's edge. Ten suitable watercourses were surveyed (as identified during the DMRB Stage 2 Assessment of the proposed scheme) where habitats were considered valuable, in terms of having potential to support foraging and resting water vole. Surveyors recorded field signs indicative of water vole where present. Signs which were searched for included: • droppings and latrines; • a network of bankside burrows; • feeding signs of neat vegetation piles; and • covered runs through vegetation.
Pine marten, red squirrel and wildcat	Croose, Birks and Schofield 2013 Gurnell, Lurz, Macdonald and Pepper 2009 SNH undated	October 2017 to September 2018	Any evidence found for these species was recorded as incidental sightings/signs observed during other habitat and species surveys. Desk-based data was used in combination with the above to assess the potential presence of these species. Surveyors recorded incidental field signs indicative of pine marten, red squirrel and wildcat where present. Signs which were searched for included: • potential pine marten or wildcat den sites; • potential pine marten scats; • squirrel feeding signs; • squirrel dreys; • sightings; and • WVIs.
Great crested newt (GCN): Habitat Suitability Index (HSI) assessment Environmental DNA (eDNA) assessment	Oldham, Keeble, Swan and Jeffcote 2000 Amphibian and Reptile Group (ARG) UK, 2010 O'Brien, Hall, Miró and Wilkinson, 2017 Biggs, Ewald, Valentini, Gaboriaud, Griffiths, Foster, Wilkinson, Arnett, Williams and Dunn 2014	January to February 2018 (HSI assessment) June 2018 (eDNA assessment)	Waterbodies within the footprint of the proposed scheme and to a 500m buffer of the proposed scheme were identified using online aerial photography and Ordnance Survey maps. Identified ponds were ground-truthed and HSI assessment was conducted using standard methodology which was adapted based on information from O'Brien, Hall, Miró and Wilkinson (2017) to account for geographic location. As HSI assessments were conducted outwith the GCN breeding season, the methods were also adapted to account for this. See Appendix A11.2 (Baseline Data and Detailed Survey Methods) for further detail. Ponds identified as suitable for GCN (ponds scoring >0.59, or ponds ≤0.59 but directly under the footprint of the proposed scheme) were targeted for eDNA assessment. Assessments followed methods approved by SNH and which provides the standard guidance across the UK. Sample analysis was undertaken by Nature Metrics in June 2018.

Survey Type	Guidance	Date Ranges	Survey Area Covered and Signs Recorded
Reptiles	Edgar, Foster and Baker 2010 Sewell, Griffiths, Beebee, Foster and Wilkinson 2013	March to September 2018	Evidence was recorded as incidental sightings found during other habitat and species surveys. Desk-based data were used in combination with the above to assess the potential presence of these species.
Phase 1 habitat survey	JNCC 2010	April 2016 October 2017 to August 2018	A Phase 1 habitat survey was undertaken within the footprint of the proposed scheme and up to 500m from the proposed scheme at A9/A96 Inshes to Smithton DMRB Stage 2 (Jacobs 2017). Targeted surveys were undertaken in 2017 and 2018, to supplement and update the data with any changes in land use and habitat classification since the DMRB Stage 2 Assessment of the proposed scheme.
Aquatic Features			
Aquatic macro-invertebrate surveys	Environment Agency 2012 ISO 10870 2012	October 2017 and April 2018	Four-point locations were surveyed on watercourses at crossing points under the footprint of the proposed scheme. Sites were chosen for presence of suitable sampling habitat and being representative of watercourses in the area. Sites were surveyed using standard methods (three-minute kick sampling and one-minute manual searching) and water chemistry parameters including water temperature, dissolved oxygen, pH, salinity and conductivity were measured and recorded using a YSI handheld multi-parameter instrument. Metrics calculated from the results of the macroinvertebrate samples were used to give an indication of: • WFD compliant macroinvertebrate classification; • species of conservation importance based on the Community Conservation Index (CCI) score; • impacts from organic pollution and degradation (Whalley, Hawkes, Paisley and Trigg (WHPT) metrics); • flow (Lotic Invertebrate Index for Flow Evaluation (LIFE) metrics); and • sedimentation (Proportion of Sediment-Sensitive Invertebrates (PSI) score). Detailed metrics calculated from the samples are given in Appendix A11.2 (Baseline Data and Detailed Survey Methods).

Consultation

11.2.13 A summary of the consultation process is provided in Chapter 6 (Consultation and Scoping) and includes input from the following key statutory consultees:

- SEPA;
- SNH; and
- The Highland Council.

Impact Assessment

11.2.14 Impact significance was assessed taking into account the nature and magnitude of potential impacts (including duration, extent, and reversibility) and their consequent effects on important ecological features, using criteria as set out below.

11.2.15 The importance of a feature was defined using criteria set out in Table 11.2 and paragraphs 11.2.16 to 11.2.19. Impact characterisation criteria are defined in Table 11.3, and paragraphs 11.2.22 to 11.2.23.

Importance

11.2.16 The general approach to defining the importance of ecological features follows that of CIEEM (2018). The approach is also in line with advice given in DMRB IAN 130/10.

11.2.17 Ecosystems, habitats and species are assigned levels of importance for nature conservation based on the criteria set out in Table 11.2.

11.2.18 The rarity, ability to resist or recover from environmental change, and uniqueness of an ecological feature, function/role within an ecosystem, and level of legal protection or designation afforded to a given ecological feature are all factors taken into account in determining its importance.

11.2.19 Only important ecological features are subject to impact assessment. Therefore, features that do not meet the criteria for at least authority area importance are not considered in detail in this assessment (see Table 11.2).

Table 11.2: Importance Criteria for Ecological Features

Importance	Criteria
International	**Ecosystems and Habitats** *Ecosystems or habitats essential for the maintenance of:* • internationally designated areas or undesignated areas that meet the criteria for designation; and/or • viable populations of species of international conservation concern. **Species** *Species whose presence contributes to:* • the maintenance of qualifying habitats, communities and assemblages that occur within internationally designated sites or within undesignated areas that meet the criteria for such designation.
National	**Ecosystems and Habitats** *Ecosystems or habitats essential for the maintenance of:* • qualifying communities and assemblages that occur within nationally designated sites or within undesignated areas that meet the criteria for such designation; and/or • viable populations of species of national conservation concern. **Species** *Species whose presence contributes to:* • the maintenance of qualifying habitats, communities and assemblages that occur within nationally designated sites or within undesignated areas that meet the criteria for such designation; or

Importance	Criteria
	• the maintenance and restoration of biodiversity and ecosystems at a national level, as defined in the Scottish Biodiversity Strategy (SBS) (Scottish Government 2013; Scottish Government 2015a).
Regional	**Ecosystems and Habitats** *Ecosystems or habitats essential for the maintenance of:* • communities and assemblages that occur within regionally important sites or localities listed as being of conservation importance in the Highland Biodiversity Action Plan (BAP) (Highland Environment Forum 2015) or within undesignated areas that meet the criteria for such designation; and/or • viable populations of species of regional conservation concern. **Species** *Species whose presence contributes to:* • the maintenance and restoration of biodiversity and ecosystems at a regional level, as defined in the Highland BAP.
Authority Area	**Ecosystems and Habitats** *Ecosystems or habitats essential for the maintenance of:* • populations of species of conservation concern within the authority area. **Species** *Species whose presence contributes to:* • the maintenance and restoration of biodiversity and ecosystems within a relevant area such as Inverness and Nairn Local Biodiversity Action Plan (LBAP) (Inverness and Nairn Biodiversity Group 2004).

11.2.20 In accordance with DMRB IAN 130/10, deer and invasive non-native species (INNS) were scoped out from ecological evaluation due to their lack of conservation status and so are not discussed further in that context. Deer are discussed in this chapter in the context of potential for vehicle collisions during the operational phase of the proposed scheme, which could have implications regarding human safety and animal welfare. INNS present a threat to biodiversity (Department for Environment, Food and Rural Affairs (DEFRA) (2015) and so are discussed in this context and, under the Wildlife and Countryside Act 1981 (as amended by the Wildlife and Natural Environment (Scotland) Act 2011 (WANE)), legal responsibilities to prevent their transfer.

11.2.21 Beaver are discussed in line with the Scottish Government's decision to accord the species protection in line with the EU Habitats Directive in May 2019 (SNH 2019a).

Impact Characterisation

11.2.22 For the purposes of this assessment, the impact descriptors in Table 11.3 are taken to summarise the overall characterisation of positive or negative impacts in accordance with CIEEM (2018), including:

- impact extent/scale (e.g. entire habitat loss, partial habitat loss or indication over specific area affected);
- direct or indirect impact (e.g. direct mortality of individuals from vehicle collisions, or indirect mortality of individuals from reduced prey resources due to pollution of watercourses);
- reversibility of impact (reversible or irreversible);
- 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).

11.2.23 The character of impacts is defined using the criteria set out in Table 11.3. Impact character was identified as high, medium, low or negligible, following the above impact characterisation approach.

Table 11.3: Impact Descriptors and Characterisation for Ecological Features

Impact Descriptor	Impact Characterisation
High	An impact resulting in a permanent effect on the distribution and/or abundance of a habitat, species assemblage/community or population, in such a way as to alter the integrity of the feature and its conservation status. If negative, this type of effect would reduce the integrity of the feature and its conservation status. If positive, it would result in an improvement to the conservation status of the feature.
Medium	An impact resulting in a long-term but reversible effect on the distribution and/or abundance of a habitat, species assemblage/community or population. If negative, this type of effect would have neutral long-term implications for the integrity of the feature or its conservation status. If positive, it would not alter the long-term conservation status of the feature.
Low	An impact resulting in a short-term reversible effect on the distribution and/or abundance of a habitat, species assemblage/community or population.
Negligible	No discernible impact on the distribution and/or abundance of a habitat, species assemblage/community or population.

Impact Significance

11.2.24 Each feature's importance and the potential impacts upon it have been determined through the above described collection of data, consultation and from prior project experience. This is to provide a robust basis for making a professional decision on the appropriate focus of the impact assessment.

11.2.25 CIEEM (2018) notes that impacts likely to be relevant in an assessment are those that are predicted to lead to significant effects (negative or positive) on important ecological features. Significant effects are those that either support or undermine biodiversity conservation objectives for important ecological features or for biodiversity in general. The conservation status for habitats is determined by the sum of the influences acting on the habitat and its typical species that may affect its long-term distribution, structure and function. It is also determined by the long-term distribution and abundance of the species' population within a given geographical area. The conservation status for species is determined by the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its population within a geographical area.

11.2.26 Knowledge and assessment of construction methods and operational activities, together with the ecological knowledge of ecologists with experience of similar large-scale infrastructure projects, have been used to identify the potential impacts of the project on ecological features.

11.2.27 Following the above approach, the assessment aims to characterise ecological impacts rather than placing a reliance only on magnitude. The character of an impact is used to inform the determination of whether or not the impact on the feature in question is a significant one.

11.2.28 Under the terms of The Roads (Scotland) Act 1984 (Environmental Impact Assessment) Regulations 2017 (hereafter referred to as the EIA Regulations), where significant impacts are identified, mitigation will be developed to reduce impacts where feasible.

11.2.29 The mitigation measures described within this DMRB Stage 3 EcIA have been incorporated into the design and operational phasing programme and taken into account in the assessment of the significance of effects. The hierarchical approach to mitigation aims to avoid or negate impacts on ecological features in accordance with best practice guidance and UK, Scottish and local government environmental impact, planning and sustainability policies.

11.2.30 Impacts that are not significant (including those where compliance with regulation is required) would be expected to be avoided or reduced through the application of the standard mitigation commitments and best working practice (e.g. mitigation of potential pollution impacts through adherence to legislative requirements and standard best practice and guidelines). Significant ecological impacts are expected to be mitigated through a combination of best practice/typical mitigation methods and also mitigation targeted to specific locations as described in this assessment.

11.2.31 Mitigation is also designed to produce a net gain for biodiversity where practicable, in line with policy (Scottish Government's Planning Advice Note 1/2013: Environmental Impact Assessment Revision 1.0 (Scottish Government 2017)) and guidelines (CIEEM 2018).

Inverness East Development Area

11.2.32 The assessment of impacts on ecological features has been undertaken based on the existing baseline at the time of surveys, but also taking into account developments that are currently under construction. While the Inverness East Development Brief (IEDB) prepared by The Highland Council (The Highland Council 2018) sets out the future aspirations for the mixed-use city expansion led by residential development in the study area, by way of a masterplan, it is not definitive in terms of street layout, design and timescales. Its realisation is also partly dependent on the implementation of the proposed scheme (or East Link as it is identified in the IEDB), with the scheme being integral to the later phases of the masterplan. Impacts or mitigation for future development identified in the IEDB have not been provided, however, it is worth noting that on completion of these, the landscape in parts of the study area is expected to undergo substantial change, with the existing farmland giving way to suburban development. It is considered that the use of the area by certain ecological features would change in terms of their foraging, commuting and use of shelters. This is considered further in Chapter 19 (Assessment of Cumulative Effects).

11.3 Baseline Conditions

Desk-based Assessment

Designated Sites

11.3.1 Three statutory designated sites lie within the study area (Figure 11.1):

- Longman and Castle Stuart Bays Site of Special Scientific Interest (SSSI) (SNH 2018c) (SNH site code 1675);
- Inner Moray Firth Special Protection Area (SPA) (SNH 2018d) (SNH site code 8515, European Union (EU) site code UK9001624); and
- Inner Moray Firth Wetland of International Importance (Ramsar) (JNCC 2008) (SNH site code 8430).

11.3.2 SWF refers to the Surface Water Feature reference applied to watercourses and waterbodies throughout the proposed scheme, as defined in Chapter 13 (Road Drainage and Water Environment).

11.3.3 The Moray Firth Special Area of Conservation (SAC) (SNH site code 8327, EU site code UK0019808) (JNCC 2018b) and the Moray Firth proposed SPA (pSPA) (SNH site code 10490, EU site code UK9020313) (SNH 2018e) lie approximately 900m from the proposed scheme but are hydrologically connected to them via Scretan Burn (SWF04) and Cairnlaw Burn (SWF08). For this reason, the SAC and pSPA will be assessed for potential impacts alongside the three statutory designated sites listed above.

Important Bird and Biodiversity Areas

11.3.4 One non-statutory site is present within the study area, the Moray Basin, Firths and Bays Important Bird and Biodiversity Area (IBA) (Figure 11.1) (Birdlife International 2018). IBAs are sites identified using internationally agreed criteria applied locally by Birdlife Partners, in the UK this is the RSPB. These criteria take into account the status of bird species and knowledge of the size and trends of bird populations.

11.3.5 The Moray Basin, Firth and Bays IBA is a complex area of coastline and estuary and forms an integral unit that is important for populations of wintering and passage wildfowl, and for breeding cormorant. The IBA covers the areas designated as the Inner Moray Firth SPA, Moray Firth Ramsar and the Moray Firth pSPA (which are designated wholly or partially for their bird assemblages) and the Moray Firth SAC.

Potential impacts and mitigation identified for the statutory designated sites would satisfy any requirement for the IBA and therefore it has not been taken forward to the impact assessment stage.

Ancient and Native Woodland

11.3.6 No Ancient Woodland Inventory (AWI) sites (SNH 2008a) were identified within the study area. However, nine sites categorised on the Native Woodland Survey of Scotland (NWSS) (Patterson, Nelson, Robertson and Tullis 2014) lie partly or entirely within the study area (Figure 11.1). Of these, one NWSS site intersects with the route of the proposed scheme (NWSS 10 near Stratton, ch850 to ch1113 of Eastfield Way Roundabout to Smithton Junction (hereafter referred to as Link 4). Site 10 has been designated as lowland mixed deciduous woodland with a 'semi-naturalness' of 90% and a 'nativeness' of 50% and has been classed as 'nearly-native'.

Biodiversity Action Plans

11.3.7 The study area is covered by the regional Highland Biodiversity Action Plan (BAP) 2015 to 2020 (Highland Environment Forum 2015) and is further covered by the Local Biodiversity Action Plan (LBAP) for Inverness and Nairn (Inverness and Nairn Biodiversity Group 2004).

11.3.8 The Highland BAP has highlighted a number of key habitats said to support significant numbers of priority species across the Highland region, including Marine and Intertidal Habitats which are present within the study area. Priorities for the period 2015 to 2020 have been grouped into six objectives. This includes three that are known, from A9/A96 Inshes to Smithton DMRB Stage 2 Assessment (Jacobs 2017), to be particularly relevant to the proposed scheme. These objectives are:

- Sustainable Management of Habitats and Species (including work on native woodland and individual species);
- Planning, Development and Infrastructure (to take biodiversity into account during building and maintenance works); and
- Invasive Non-native Species.

11.3.9 The Inverness and Nairn LBAP covers 35 habitats in six broad groups, 26 plants (vascular plants, bryophytes and lichens), 21 mammals, 62 birds and 14 species of fish. The LBAP covered the period 2004 to 2014 and whilst it had been hoped that the LBAP would be updated, this has not occurred and the 2004 publication remains the most up to date.

11.3.10 Where ecological features listed in the Highland BAP and the Inverness and Nairn LBAP are located within the study area, these are detailed in Table 11.4.

Terrestrial Habitats

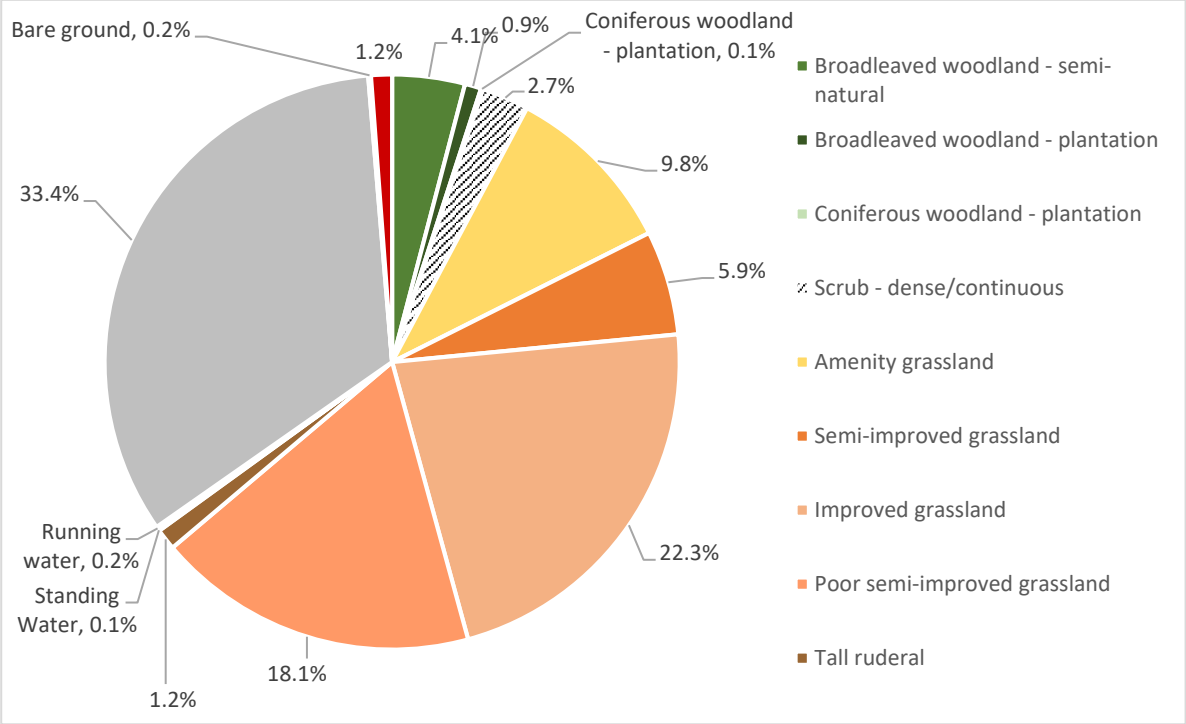
11.3.11 The A9/A96 Inshes to Smithton DMRB Stage 2 assessment (Jacobs 2017) identified the study area of the proposed scheme to be predominantly agricultural habitat (arable and grassland) with amenity grassland and built-up areas (Figure 11.2). Small areas of woodland with scattered trees and shrubs were also present. No wetland habitats were identified and no AWI sites are present. Updates to the data since the DMRB Stage 2 Assessment of the proposed scheme were required where works relating to the Stratton development commenced and habitat was removed. Target notes from the A9/A96 DMRB Stage 2 Phase 1 habitat surveys are detailed in Appendix 11.2 (Baseline Data and Detailed Survey Methods).

11.3.12 Mature broadleaved trees were highlighted as being of importance to the local community during consultation on the designs for the DMRB Stage 2 Assessment of the proposed scheme. These trees have been assessed individually for bat roost potential but will be discussed as a whole in relation to their landscape and amenity value in Chapter 9 (Landscape).

11.3.13 Diagram 11.1 summarises all habitats identified within 500m of the proposed scheme according to the baseline data collated through the Phase 1 habitat survey. However, as noted above it is acknowledged

that there are areas that fall under new developments, or developments currently under construction, and as such the habitats within 500m of the proposed scheme may have been altered since the surveys (Figure 11.2).

Diagram 11.1: Phase 1 Habitats Identified Within 500m of the Proposed Scheme.



11.3.14 Grassland and woodland together accounted for approximately 61.2% of the area, of which grassland accounts for 56.1% and woodland for 5.1%. Arable land accounted for approximately 33.4% and approximately 2.5% comprised unmanaged and poorly managed areas.

Aquatic Habitats

11.3.15 The proposed scheme crosses four watercourses: Scretan Burn (SWF04) and one of its tributaries (Tributary of Scretan Burn (SWF05); Cairnlaw Burn (SWF08) and Beechwood Burn (SWF03). At A9/A96 DMRB Stage 2 (Jacobs 2017), Cairnlaw Burn (SWF08) and Scretan Burn (SWF04) were assessed as being of 'medium' ecological value, with supporting habitat for aquatic species. Medium ecological value is typically where there are two or more flow types, heterogeneous habitat, some in-stream and/or bankside fish cover, potential to support species of conservation interest, some habitat modifications and where barriers to migration may be present. The remaining watercourses were assessed as having little supporting habitat for aquatic species and were classified as having low ecological value.

11.3.16 Cairnlaw Burn (SWF08) is the only watercourse within 100m of the proposed scheme that is classified by SEPA as part of the River Basin Management Plan (RBMP) (SEPA 2015a), in accordance with Annex V of the EU WFD 2000/60/EC. It was given an overall Moderate classification in 2017 and designated as Moderate for ecology.

Fish

11.3.17 On the basis of site survey data obtained during the DMRB Stage 2 Assessment of the proposed scheme (Jacobs 2017), Cairnlaw Burn (SWF08) is the only watercourse within the study area thought to both allow the upstream passage of migratory fish and contain suitable habitat to support fish species of conservation interest. Multiple habitat types and heterogeneous flows were reported along the length of the burn, with some undercutting of natural wooden banks in the lower reaches providing limited in-

stream cover. Cairnlaw Burn (SWF08) has been assigned a WFD classification of Moderate for fish and fish passage.

11.3.18 Fish surveys undertaken to inform the DMRB Stage 3 Environmental Statement for the A96 Dualling Inverness to Nairn (including Nairn Bypass) scheme (Jacobs 2016) recorded brown trout, European eel and three-spined stickleback in Cairnlaw Burn (SWF08). Of these, brown trout and European eel are listed as priority species in the Inverness and Nairn LBAP (Inverness and Nairn Biodiversity Group 2004). European eel is listed as Critically Endangered on the International Union for Conservation of Nature (IUCN) Red List (Jacoby and Gollock 2014). Atlantic salmon, which is of considerable international and regional conservation interest, has similar habitat and access requirements to brown trout but a detailed desk study found no published records of Atlantic salmon in the Cairnlaw Burn (SWF08).

Macroinvertebrates

11.3.19 Habitat assessments undertaken during the DMRB Stage 2 Assessment of the proposed scheme (Jacobs 2017) noted suitable areas of macroinvertebrate habitat in Cairnlaw Burn (SWF08), Scretan Burn (SWF04) and Inshes Burn (SWF02), although the presence of species of conservation interest was considered unlikely. In the 2017 round of WFD classifications, Cairnlaw Burn (SWF08) was assigned an overall WFD classification of Good for invertebrates, Good for the classification of Macroinvertebrates (River Invertebrate Classification Tool (RICT)/Whalley, Hawkes, Paisley and Trigg (WHPT)) and Macroinvertebrates (Average Score Per Taxon (ASPT)), and a High classification for Macroinvertebrates (Number of Scoring Taxa (NTAXA)). There are no fully aquatic invertebrates listed in the Inverness and Nairn LBAP (Inverness and Nairn Biodiversity Group 2004).

11.3.20 Two regionally important species of macroinvertebrates were identified within the desk-based assessment; one NBN record of *Protonemura meyeri* and one NBN record of *Planaria torva* (NBN 2018a).

Protected Species

11.3.21 Data obtained during the desk-based assessment, as described in paragraphs 11.2.8 to 11.2.10, which includes the results of the fieldwork carried out for the DMRB Stage 2 Assessment of the proposed scheme (Jacobs 2017), identified the potential presence of the following protected species within the study area:

- badger: Scottish Badgers provided records between 2003 and 2019 of badger presence within the study area, and setts were recorded during the DMRB Stage 2 Assessment of the proposed scheme (Jacobs 2017) and A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 3 Environmental Statement (Jacobs 2016);
- bats: common and soprano pipistrelle bats were recorded at the north of the study area around the locality of Stratton Farm and four non-breeding roost sites were identified (locations unknown) (WSP Energy and Environment 2009). During surveys to inform the A96 Dualling Inverness to Nairn (including Nairn Bypass) scheme DMRB Stage 3 Assessment, one non-breeding soprano pipistrelle roost was recorded in a building 1km to the north-east of the proposed scheme and a brown long-eared maternity and soprano pipistrelle summer roost was recorded in a building 8km to the north-east (Jacobs 2016). The DMRB Stage 2 Assessment of the proposed scheme identified 11 high potential habitat areas (for roosting, commuting and foraging) and six moderate potential areas within the study area (Jacobs 2017). There are NBN (NBN 2018a) records within a 10km radius of the study area for Daubenton's (between 2008 and 2016) and one Natterer's bat in 2010;
- breeding birds: suitable habitat was recorded during the DMRB Stage 2 Assessment of the proposed scheme (Jacobs 2017). Data received from the Highland Raptor Study Group indicate that buzzards are known to have bred in woodland at Stratton to the north of the proposed scheme;
- wintering birds: suitable habitat for wintering birds is present as identified by the designated sites present within the study area;

- otter: evidence of otter was recorded during the DMRB Stage 2 Assessment of the proposed scheme (Jacobs 2017);
- water vole: evidence of water vole recorded on Inshes Burn (SWF02) within the Inverness Retail and Business Park as detailed in the A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 3 Environmental Statement (Jacobs 2016);
- pine marten: a pine marten Wildlife Vehicle Incident (WVI) was recorded near Scretan Burn (SWF04) as detailed in the A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 2 Assessment (Jacobs 2014);
- red squirrel: presence confirmed to the south of the study area in Balvonie Wood during A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 2: Extended Phase 1 habitat surveys (Jacobs 2011) and were recorded over 14km north-east of the proposed scheme at Blackcastle Quarry, Crook Wood and Russell's Wood during A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 3 surveys (Jacobs 2016);
- amphibians: great crested newt (GCN) were recorded to the north-east of the study area (Atkins 2008). Common frog, common toad, palmate newt and smooth newt were identified to the north-east of the study area during A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 3 surveys (Jacobs 2016);
- reptiles: common lizard were identified to the north-east of the study area during A96 Inverness to Nairn (including Nairn Bypass) DMRB Stage 2 surveys (Jacobs 2014). Slow worm was identified within 10km of the study area between 2008 and 2014 (NBN 2018a);
- trout (brown/sea): recorded in the Cairnlaw Burn (SWF08) during the A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 3 surveys (Jacobs 2016) and suitable habitat was recorded in Scretan Burn (SWF04) during surveys for the DMRB Stage 2 Assessment of the proposed scheme (Jacobs 2017); and
- European eel: recorded in the Cairnlaw Burn (SWF08) during the A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 3 surveys (Jacobs 2016).

11.3.22 Data obtained during the desk-based assessment, as described in paragraphs 11.2.8 to 11.2.10, which included a review of the DMRB Stage 2 Assessment of the proposed scheme (Jacobs 2017) identified that the following species were likely to be absent from the study area:

- freshwater pearl mussel (FWPM): no evidence of FWPM or suitable habitat were recorded during the DMRB Stage 2 Assessment of the proposed scheme and no records were identified on NBN (NBN 2018a); and
- beaver: no evidence of beaver was recorded in the DMRB Stage 2 Assessment of the proposed scheme and no records were identified on NBN (NBN 2019).

Other Species of Interest

Invasive Non-native Species

11.3.23 Two invasive non-native plant species, few-flowered leek and Himalayan balsam, were recorded in the study area during the DMRB Stage 2 Assessment of the proposed scheme (Jacobs 2017). Evidence of American mink, an invasive non-native animal species, was recorded on Scretan Burn (SWF04) during the A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 3 surveys (Jacobs 2016). Details of the location of these species can be found in Table 20 in Appendix A11.2 (Baseline Data and Detailed Survey Methods).

Site Surveys

Terrestrial Features

11.3.24 Full survey results are provided in Appendix A11.2 (Baseline Data and Detailed Survey Methods), except for confidential features (badger, otter, barn owl and breeding Schedule 1 bird species), where results are provided in Appendix A11.3 (Confidential Ecology Features).

Badger

11.3.25 Setts were identified within the study area, as well as field signs including dung pits, prints and hair (Figure 11.3 – accompanies Appendix A11.3 (Confidential Ecology Features)).

Bat: Ground Assessment

11.3.26 Thirty-two buildings with summer roosting potential, one of which also had moderate hibernation potential, were identified within the ground-assessment study area (Figure 11.4). None of the buildings were located under the footprint of the proposed scheme. Five of the buildings had high summer roosting potential, nine had moderate potential and 18 had low potential.

11.3.27 Five structures with summer roosting potential were identified within the study area (Figure 11.4). None of the structures were located under the footprint of the proposed scheme. One of the structures had moderate summer roosting potential and four had low potential. None of the structures had hibernation potential.

11.3.28 Two hundred and thirty-six trees with bat potential were identified within the study area. Forty-nine of these trees had high potential, 80 had moderate potential and 107 had low potential.

11.3.29 Eleven of the 236 trees identified were located under the footprint of the proposed scheme. Of these eleven trees, two had high potential, four had moderate potential and five had low potential (Figure 11.4).

11.3.30 Thirty-five of the 236 trees are located under the footprint of the A96 Dualling Inverness to Nairn (including Nairn Bypass) scheme. Two of these trees form part of the 11 trees which are also under the footprint of the proposed scheme.

Bat: Roost Surveys

11.3.31 One building was located within the roost survey area (within 30m of the proposed scheme) and one further building was surveyed which was located within 100m of the offline section of the proposed scheme. No summer roosts were identified in the two buildings surveyed within the roost survey study area.

Bat: Crossing Point Surveys

11.3.32 Of the bat crossings recorded, 18% of bats crossed the proposed scheme at a height of 0 to 2m; 55% crossed at height of 2 to 5m and 27% crossed at a height of more than 5m. This equates to 73% of bats crossing at heights which would be at risk of being hit by vehicles on the proposed scheme (Figure 11.5).

Bat: Static Detector Surveys

11.3.33 Three static detector locations were identified to have an overall value on a local level of High, five with an overall value of Moderate and two with an overall value of Low as shown on Figure 11.6.

11.3.34 At a regional level, five detector locations were assessed as having an overall activity value of Moderate to High, three had an overall activity of Moderate, and two had an overall activity value of Low to Moderate or Low.

Breeding Birds (excludes Schedule 1 Bird Species)

11.3.35 Fifty-seven species were recorded within the study area across the four breeding bird walkover surveys. Of these, 43 species were considered likely to have bred.

11.3.36 Twelve of the species recorded are red-listed and 16 are amber-listed on the Birds of Conservation Concern (Eaton, Aebischer, Brown, Hearn, Lock, Musgrove, Noble, Stroud and Gregory 2015). Twenty species are listed on the Scottish Biodiversity List (SBL) (Scottish Government 2015b) and 20 are listed separately on the Inverness and Nairn LBAP (Inverness and Nairn Biodiversity Group 2004).

11.3.37 Of the 43-breeding species, the most frequently recorded was wren with an estimated 35 breeding territories. Blackbird, blue tit, chaffinch, skylark, starling, robin and yellowhammer had between 15 and 35 breeding territories. Starling, yellowhammer and skylark were the most abundant red-listed species with over 15 breeding territories recorded for each species.

11.3.38 See Figure 11.8 for further detail.

Schedule 1 Bird Species (Barn Owl, Red Kite and Quail)

11.3.39 Breeding barn owl were identified within the study area during the surveys (Figure 11.9 – accompanies Appendix A11.3 (Confidential Ecology Features)). Furthermore, quail and red kite were recorded within the study area during the breeding bird surveys (Figure 11.9 – accompanies Appendix A11.3 (Confidential Ecology Features)).

Wintering Birds

11.3.40 Eight species of wader and wildfowl were recorded during targeted wintering bird surveys. A total of 354 observations were recorded of birds across the two survey areas i.e. within the 500m study area and the 5km study area (Figure 11.10), including those recorded flying. Surveys identified 42 fields within which waders and wildfowl were observed foraging, loafing, diurnal high tide roosting and overnight roosting. Nine of these fields were within 500m and 33 were within 5km. Flight activity directly over the proposed scheme is shown in Figure 11.10.

11.3.41 The most abundant species recorded was pink-footed goose with a peak count of 2,740 individuals, followed by lapwing (330 individuals), greylag goose (130 individuals), curlew (119 individuals) and oystercatcher (81 individuals, with an additional 40 recorded in the same survey indicating an overall peak of 112). Less than 10 individuals were recorded for the remaining species; barnacle goose, common snipe and whooper swan. Common snipe and whooper swan were recorded in flight only.

11.3.42 The data showed variations in usage of the study area by the species. Greylag goose and pink-footed goose were recorded on the ground within 500m study area between December and March (inclusive) in fields of semi-improved grassland. Curlew and lapwing were recorded across the full survey period (October to March inclusive, although no curlews were recorded in February) and favoured semi-improved grassland although a mixture of arable stubble and ploughed fields were also used. A small roost of greylag geese (11 individuals) was identified within 300m of the proposed scheme to the north-east of Ashton Farm and an overnight roost of 120 lapwing was recorded nearby within 150m of the proposed scheme (Figure 11.10).

Otter

11.3.43 No otter holts or couches were recorded within the study area. Field signs including spraints and footprints were recorded (Figure 11.11 – accompanies Appendix A11.3: Confidential Ecology Features).

Water Vole

11.3.44 No evidence of water vole was recorded within the study area; however, suitable habitat was recorded throughout the study area.

Pine Marten, Red Squirrel and Wildcat

11.3.45 No incidental evidence of pine marten, red squirrel or wildcat was recorded within the study area.

Great Crested Newt

11.3.46 Six ponds were subject to Habitat Suitability Index (HSI) assessment and from those, four were subject to environmental DNA (eDNA) assessment. The eDNA results were negative for all ponds, confirming likely absence of great crested newts (Figure 11.12).

Aquatic Features

11.3.47 Information gathered during the DMRB Stage 2 Assessment of the proposed scheme (Jacobs 2017) and the DMRB Stage 3 Environmental Statement for the A96 Dualling Inverness to Nairn (including Nairn Bypass) scheme (Jacobs 2016) was sufficient to inform an assessment of fish receptors likely to be impacted by the proposed scheme. Three watercourses (Cairnlaw Burn (SWF08), Inshes Burn (SWF02) and Scretan Burn (SWF04) were identified as having the potential to both contain populations of freshwater macroinvertebrates and be impacted by the proposed scheme. These three watercourses were subject to further analysis using freshwater macroinvertebrate health metrics (Figure 11.13).

Freshwater Macroinvertebrates

11.3.48 Freshwater macroinvertebrate surveys were undertaken on Cairnlaw Burn (SWF08), Scretan Burn (SWF04) and Inshes Burn (SWF02), with two locations selected on Scretan Burn (Scretan Burn North and Scretan Burn South) to coincide with two potential crossing points.

11.3.49 Detailed results of the macroinvertebrate surveys are given in Appendix A11.2 (Baseline Data and Detailed Survey Methods). A conservation classification was determined for each watercourse based on the conservation values assigned to the macroinvertebrates present at each site. Overall watercourse valuations ranged from low (Cairnlaw Burn (SWF08)) to high conservation value (Scretan Burn South (SWF04)). The stonefly species *Nemoura erratica*, recovered from Inshes Burn (SWF02) (autumn) and Scretan Burn South (SWF04) (spring) is considered a locally important species. The flatworm species *P. torva* (recorded in Inshes Burn (SWF02)), stonefly species *P. meyeri* (recorded in Scretan Burn North and South (SWF04)) and the cased caddisfly *Potamophylax rotundipennis* (sampled from Scretan Burn South (SWF04)) are all regionally notable species. Conservation categories applied to specific macroinvertebrate species are not measured on the same scale as the overall evaluation classifications applied in this EcIA, and only records of *N. erratica* and *P. rotundipennis* are scarce within the greater Inverness area (NBN 2018a).

11.3.50 Combined results from the spring and autumn surveys showed that Scretan Burn North and South (SWF04) and Inshes Burn (SWF02) all had an overall classification of Good ecological status for macroinvertebrates. Cairnlaw Burn (SWF08) was given a Moderate ecological designation, but this classification was only informed by the autumn sample due to access restrictions preventing the recovery of samples in spring 2018.

11.3.51 The 2017 WFD overall classification for aquatic macroinvertebrates in Cairnlaw Burn (SWF08) was Good. WFD Good classifications were also applied to the parameters Macroinvertebrates (RiCT/ WHPT) and Macroinvertebrates (ASPT); and a High classification was applied to Macroinvertebrates (NTAXA). The Moderate classification obtained for Cairnlaw Burn (SWF08) during DMRB Stage 3 Assessment, is only indicative of one seasonal sample and is therefore not directly comparable to classifications provided by SEPA, which take into account a combination of spring and autumn samples.

Evaluation

11.3.52 The legal status and conservation status of ecological features within the study area are provided in Table 11.4, along with a short justification for the assigned conservation importance of each feature. The evaluations take into account baseline conditions and utilise the criteria in Table 11.2 to develop an

understanding of the implications for features that may be affected by the proposed scheme. Features are ordered by importance, with habitats followed by species.

11.3.53 Deer and INNS were scoped out from ecological evaluation as explained in paragraph 11.2.20.

11.3.54 The following features are unlikely to be affected by the proposed scheme as, based on currently available desk-based assessment and/or site survey data, they are not known to be present within the study area, or no effects to pathways were identified. These features will therefore not be discussed further:

- FWPM is considered to be internationally important and are protected under the Wildlife and Countryside Act 1981 (as amended) (WCA) but were not recorded in the study area;
- pine marten is regionally important and protected under the WCA. Only one WVI record was recorded in the A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 2 Assessment (Jacobs 2014) and no suitable pine marten habitat or connecting habitat has been identified within the study area;
- red squirrel is regionally important and protected under the WCA. Limited suitable red squirrel habitat has been identified within the study area, comprising an area of broadleaved woodland at the western extent of the proposed scheme (Figure 11.2). However, this area has no connectivity to other suitable habitat and no evidence of red squirrel was found within the study area;
- Scottish wildcat is internationally important and protected under the Conservation (Natural Habitats &c.) Regulations 1994 (as amended in Scotland) and no suitable habitat has been identified within the study area;
- water vole is regionally important and protected under the WCA. Suitable habitat was present along seven watercourses, but no evidence of the species was identified in the study area during any field surveys;
- beaver is internationally important and protected under the Conservation (Natural Habitats &c.) Regulations 1994 (as amended in Scotland) from May 2019, but were not recorded in the study area;
- reptiles are regionally important and protected under the WCA. Common lizard was identified in the desk-based assessment to the north-east of the study area during A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 2 surveys (Jacobs 2014) but no evidence was identified in the study area during field surveys; and
- amphibians (excluding GCN) are protected under the WCA and GCN are protected under the Conservation (Natural Habitats &c.) Regulations 1994 (as amended in Scotland). All suitable GCN ponds tested were negative for presence of GCN. No other amphibians were identified in the study area during field surveys.

Table 11.4: Legal Status, Baseline and Evaluation of Terrestrial and Aquatic Features

Ecological Feature	Legal/BAP Status	Baseline	Justification	Importance
Designated Sites				
Moray Firth SAC (UK0019808)	Natura 2000 site designated under Conservation (Natural Habitats &c.) Regulations 1994 (as amended in Scotland).	A total of four statutory designated sites and one proposed designated site are located within and adjacent to the study area. Three of the sites lie within the 500m study area (Inner Moray Firth SPA, Inner Moray Firth Ramsar site and Longman and Castle Stuart Bays SSSI) whereas the Moray Firth SAC and the Moray Firth pSPA lie outwith the 500m study area, but are hydrologically connected.	A 151,273.99ha site designated for bottlenose dolphin and for its subtidal banks (JNCC 2018b). Scretan Burn (SWF04) and Cairnlaw Burn (SWF08), which are crossed by the proposed scheme, are directly hydrologically connected to the SAC. The SAC encompasses the Beauly Firth, Inverness Firth and the outer reaches of Dornoch and Cromarty Firths. The site is one of the largest marine SACs in the UK and physical conditions vary considerably within the site. The SAC supports a significant presence of the sandbank feature and it encompasses a broad range of underwater sediments that are subject to a wide variety of environmental conditions. The SAC hosts the only resident population of bottlenose dolphins in the North Sea, representing one of only two such populations currently known to occur within UK coastal waters (SNH 2006).	International
Inner Moray Firth SPA (UK9001624)	Natura 2000 site designated under Conservation (Natural Habitats &c.) Regulations 1994 (as amended in Scotland).		A 2,290.25ha site designated for non-breeding bar-tailed godwit, cormorant, curlew, goldeneye, goosander, greylag goose, oystercatcher, red-breasted merganser, redshank, scaup, teal, wigeon and waterfowl assemblage and for breeding common tern and breeding and foraging osprey (SNH 2018d). The SPA comprises the Beauly Firth and Inverness Firth which together form the easternmost estuarine component of the Moray Basin ecosystem. The site includes two bays (Longman and Castle Stuart) to the east of Inverness which are coincident with the Longman and Castle Stuart Bays SSSI.	International
Moray Firth proposed SPA (UK9020313)	Once approved this will be a Natura 2000 site designated under Conservation (Natural Habitats &c.) Regulations 1994 (as amended in Scotland).		A 176,235.95ha site proposed to be designated for breeding and non-breeding shag and non-breeding common scoter, eider, goldeneye, great northern diver, long-tailed duck, red-breasted merganser, red-throated diver, scaup, Slavonian grebe and velvet scoter (SNH 2018e). The pSPA is a funnel-shaped body of sea extending seaward from the Helmsdale coast in the north, to Portsoy in the east and includes the outer Dornoch and Cromarty Firths, Beauly and Inverness Firths, as well as part of the wider Moray Firth.	International
Inner Moray Firth Wetland of International Importance (Ramsar)	Ramsar sites are classified under the Convention on Wetlands of International Importance (1971).		A 2,339.25ha site designated for non-breeding bar-tailed godwit, greylag goose, red-breasted merganser, redshank and waterfowl	International

Ecological Feature	Legal/BAP Status	Baseline	Justification	Importance
			assemblage and for its intertidal mudflats and sandflats, saltmarsh, sand dunes and shingle. The Ramsar site comprises the Beauly Firth and Inverness Firth which together form the easternmost estuarine component of the Moray Basin ecosystem. This site is especially important for the populations of wintering waterfowl which feed and roost here each year (JNCC 2008).	
Longman and Castle Stuart Bays SSSI	Designated under the Nature Conservation (Scotland) Act 2004 (NCSA 2004).		A 421.5ha site designated for non-breeding cormorant, goldeneye, red-breasted merganser, redshank and wigeon and for its eelgrass beds, mudflats and saltmarsh. Longman and Castle Stuart Bays sweep north-eastwards from Inverness for approximately 8km to Fisherton. The site extends across the same area as the Inner Moray Firth SPA (SNH 2018c). SNH indicated that the site is close to an area of major current and proposed industrial, retail, amenity and residential development, and that these could lead to impacts on the quality of water entering the site and to disturbance of wintering birds (Jacobs 2016).	National
Habitats and Ecosystems				
Watercourses: Cairnlaw Burn (SWF08), Scretan Burn (SWF04), Inshes Burn (SWF02), Beechwood Burn (SWF03), tributary of Scretan Burn (SWF05), Indirect tributary of Scretan Burn (SWF06), un-named drain (SWF07)	Cairnlaw Burn (SWF08) has a SEPA WFD overall classification of Moderate, with Moderate ecological potential. IUCN Critically Endangered (European eel). European Commission (2007) Council Regulation (1100/2007/EC) Establishing measures for the recovery of the stock of European eel.	Cairnlaw Burn (SWF08) has suitable habitat and migratory passage to support fish species of conservation interest. Habitat suitable to support macroinvertebrate communities is present throughout Cairnlaw Burn (SWF08).	Walkover surveys for the DMRB Stage 2 Assessment for the proposed scheme (Jacobs 2017) noted suitable habitat and access for fish species of conservation interest, including lamprey (brook, river and sea) ammocoetes (juveniles). Suitable macroinvertebrate habitat was also noted. Electrofishing surveys undertaken to inform the DMRB Stage 3 assessment for the A96 Dualling Inverness to Nairn (including Nairn Bypass) found brown (sea) trout, European eel and stickleback in Cairnlaw Burn (SWF08), but no evidence of lamprey (Jacobs 2016). European eel is a critically endangered species and reported numbers in the area are low (DEFRA 2010).	Regional
	N/A	Fish habitat and accessibility is restricted by the presence of a migratory barrier that prevents the upstream migration of fish species of conservation interest within Scretan Burn (SWF04). No suitable habitat for fish species of conservation interest was recorded in Inshes Burn (SWF02).	Walkover surveys for the DMRB Stage 2 Assessment for the proposed scheme (Jacobs 2017) and surveys undertaken to inform the DMRB Stage 3 Assessment for the A96 Inverness to Nairn (including Nairn Bypass) (Jacobs 2016) noted multiple in-stream barriers. Suitable habitat to support brown (sea) trout, European eels and adult lamprey are present upstream of the barrier closest to the mouth, but its presence is thought to prevent the upstream migration of species of conservation interest. Walkover surveys for the DMRB Stage 2 Assessment for the proposed scheme (Jacobs 2017) reported suitable macroinvertebrate	Authority

Ecological Feature	Legal/BAP Status	Baseline	Justification	Importance
		Habitat suitable to support macroinvertebrate communities is present throughout Scretan Burn (SWF04) and Inshes Burn (SWF02).	habitat in Scretan Burn (SWF04) and Inshes Burn (SWF02). Results of 2017 and 2018 macroinvertebrate sampling found the regionally notable stonefly *P. meyeri* at two locations in Scretan Burn (SWF04) and the regionally notable flatworm *P. torva* in Inshes Burn (SWF02).	
	N/A	No habitat suitable for fish or macroinvertebrates was recorded in Beechwood Burn (SWF03), tributary of Scretan Burn (SWF05), the indirect tributary of Scretan Burn (SWF06) or the un-named drain (SWF07).	No suitable macroinvertebrate habitat was present in Beechwood Burn (SWF03) or the tributary and indirect tributary of Scretan Burn (SWF05 and SWF06) and un-named drain (SWF07) (Jacobs 2017).	Less than authority area
Broadleaved semi-natural or plantation woodland	Lowland mixed deciduous woodland is listed on the SBL.	Areas of woodland occur across the proposed scheme area; none were listed on the AWI. Two areas at Stratton, one which intersects with the proposed scheme, are classed as 'nearly-native' on the NWSS. Details relating to woodland habitats can be found in the Terrestrial habitats section above and Diagram 11.1.	Woodlands areas are not listed on the AWI and not of a standard to be classed as a BAP habitat. Furthermore, 'nearly-native' woodland on the NWSS is defined as woodland where native species comprise 40-50% of the canopy (Forestry Commission Scotland 2018), with approximately half the woodland consisting of non-native species.	Less than authority area
Terrestrial Species				
Wintering birds (wildfowl): barnacle goose, greylag goose, pink-footed goose, whooper swan	Greylag goose (non-breeding) are a qualifying feature of the Inner Moray Firth SPA and Ramsar site (SNH 2018d; JNCC 2008). Birds of Conservation Concern (Eaton, Aebischer, Brown, Hearn, Lock, Musgrove, Noble, Stroud and Gregory 2015) (all four species are amber listed). Barnacle goose and whooper swan listed on the SBL. Listed on the Inverness and Nairn LBAP (all except barnacle goose).	Within 5km of the proposed scheme, four wildfowl species were recorded in terrestrial habitats. The most abundant was pink-footed goose (up to 2,740 individuals) followed by greylag goose (up to 130 individuals). Within 500m of the proposed scheme, pink-footed geese and greylag geese were recorded on the ground in December 2017 to March 2018 (inclusive). Average counts (mean of peak monthly counts in the winter of 2017/18) were over 550 pink-footed geese and nine greylag geese. A peak count of 25 greylag geese was recorded within 500m of the proposed scheme in February. This	Non-breeding greylag goose is listed as a qualifying feature of the Inner Moray Firth SPA and Ramsar site (SNH 2018d; JNCC 2008). Pink-footed goose and greylag goose have been recorded foraging and loafing in close proximity to the proposed scheme. The UK supports the entire global population of wintering Icelandic/Greenland breeding pink-footed goose (not including the Svalbard breeding population which overwinter in the Netherlands, Denmark and Belgium). Between 50% and 66% of the UK population are present in Scotland during autumn and winter (JNCC 2018c). The UK also exclusively supports the global population of Icelandic breeding greylag geese (not including the Scottish breeding population) (JNCC 2018d). Geese numbers in the study area do not appear to be limited by the availability of habitat and the data show that geese forage within 50m of the existing A96 Aberdeen – Inverness Trunk Road undisturbed. The A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 3 surveys showed geese only use approximately 2% of the total potentially available habitat in the area (Jacobs 2016). Additionally, foraging site fidelity is low, the data show that geese do	International

Ecological Feature	Legal/BAP Status	Baseline	Justification	Importance
		represents 0.9% of the Inner Moray Firth SPA qualifying population of greylag goose (SNH 2018d). Greylag geese roosted in small numbers (up to 11 individuals) within 300m of the proposed scheme in December and January. Two barnacle geese were recorded associating with larger flocks of pink-footed and greylag geese in February. Whooper swan was only recorded in flight within the survey area. Full survey results are detailed in Appendix A11.2 (Baseline Data and Detailed Survey Methods).	not continuously use the same fields for foraging and instead opt for preferred agricultural land use types at different stages in the winter (Appendix A11.2: Baseline Data and Detailed Survey Methods). Due to this preference for agricultural land use types, as opposed to specific locations, field boundaries have been used for the purposes of the assessment.	
Wintering birds (waders): common snipe, curlew, lapwing, oystercatcher	Curlew and oystercatcher (both non-breeding) are assemblage qualifying features of the Inner Moray Firth SPA (SNH 2018d). Birds of Conservation Concern (Eaton, Aebischer, Brown, Hearn, Lock, Musgrove, Noble, Stroud and Gregory 2015) (curlew and lapwing red listed, oystercatcher amber listed). Curlew and lapwing listed on SBL. Listed on the Inverness and Nairn LBAP (all except oystercatcher).	Within 5km of the proposed scheme, four wader species were recorded in terrestrial habitats. The most abundant was lapwing (up to 330 individuals) followed by curlew (up to 119 individuals). Within 500m of the proposed scheme lapwing and curlew were recorded throughout the survey months except February and lapwing from November to February (inclusive). Average counts of 81 lapwing and 36 curlew were recorded although numbers peaked at 214 and 65 individuals, respectively. This represents 5.2% of the Inner Moray Firth SPA qualifying population of curlew (SNH 2018d). Both species used the area for diurnal high tide roosting, loafing and foraging. A minimum of 120 lapwing also roosted overnight within 150m of the proposed scheme in December. Oystercatcher (up to 112 individuals) were regularly recorded along the coast of Longman Bay near Allanfearn over 1.5km from the	Curlew and oystercatcher are listed as part of the non-breeding assemblage of the Inner Moray Firth SPA (SNH 2018d). Common snipe, curlew, lapwing and oystercatcher are widespread waders within Scotland although in recent years there has been decline in curlew and lapwing population and range. Curlew was red listed in the Birds of Conservation Concern for the first time in 2015 (Eaton, Aebischer, Brown, Hearn, Lock, Musgrove, Noble, Stroud and Gregory 2015), lapwing was red listed in 2009 (Eaton, Brown, Noble, Musgrove, Hearn, Aebischer, Gibbons, Evans and Gregory 2009). Curlew and lapwing have been recorded foraging, loafing and diurnal high tide roosting in close proximity to the proposed scheme. Lapwing have also been recorded roosting overnight. The data shows that lapwing were more abundant within 500m of the proposed scheme (average count of 81 individuals) compared to within 5km (59 individuals) (Appendix A11.2: Baseline Data and Detailed Survey Methods). Oystercatcher have been regularly recorded within the survey area although the key wintering areas identified are greater than 1.5km from the proposed scheme. As for wildfowl, due to the preference for agricultural land use types, as opposed to specific locations, field boundaries have been used for the purposes of the assessment.	International

Ecological Feature	Legal/BAP Status	Baseline	Justification	Importance
		proposed scheme. Common snipe was recorded on two occasions in flight within 500m of the proposed scheme. Full survey results are detailed in Appendix A11.2 (Baseline Data and Detailed Survey Methods).		
Bats	All UK bat species are European Protected Species (EPS) under the Conservation (Natural Habitats &c.) Regulations 1994 (as amended in Scotland). There are 10 species of bat known to occur in Scotland and all, with the exception of Leisler's bat, are listed on the SBL. Soprano pipistrelle and brown long-eared bat are listed as a priority species on the Highland BAP. Soprano pipistrelle, common pipistrelle, Natterer's bat, Daubenton's bat and brown long-eared bat are listed as priority species on the Inverness and Nairn LBAP. The parti-coloured bat and the Leisler's bat are IUCN Red List Species (Least Concern).	No roosts were identified within the study area. Eleven trees with bat roost potential were identified under the footprint of the proposed scheme; two with high potential, four with moderate potential and five with low potential. The crossing point surveys identified that 73% of bats were crossing at a height of between 0 to 5m and would therefore be flying at heights at risk of collision with vehicles on the proposed scheme. At a local level, three static detector locations had an overall value of High, five had a value of Moderate and two had a value of Low. At a regional level, five detector locations were assessed as having an overall activity value of Moderate to High, three had an overall activity of Moderate, and two had an overall activity value of Low to Moderate or Low. Calls were recorded on the static detector at crossing point CP2 in August 2018 over one night that were not made by a species that's native range would include the Inverness area. Detailed sound analysis was undertaken on these calls that determined the bat to be most likely a parti-coloured bat or a Leisler's bat.	The parti-coloured bat occurs over a wide area in Europe, from eastern France and Switzerland, eastward through central Europe to Ukraine and into Asia and southern Siberia. It is a migratory species in eastern Europe and vagrants are frequently reported well outwith their known range. They have been reported to migrate up to 180km a day (Haddow and Goeckeritz 2014). There are two available NBN records of parti-coloured bat in the UK from the last ten years in 2009 and 2011; both of these are from Scotland (NBN 2018b). There are no known resident populations within the UK and the small numbers of records of the parti-coloured bat found in Scotland are considered to be vagrant bats (Racey, Raynor and Pritchard 2004). Leisler's bats are classed as rare species in Scotland (Wray, Wells, Long and Mitchell-Jones 2010) with an estimated Scottish population of 250 (Battersby and Tracking Mammals Partnership 2005) and the estimated UK population is a minimum of 24,000 and a maximum of 40,000 and is widely distributed throughout central and southern England and rarer in the north and the south-west (JNCC 2013b). Resident populations in Scotland are confined to the south-west in Dumfries and Galloway and Ayrshire (JNCC 2013a). There are no records of resident populations of Leisler's bats in or near the Inverness area and the species would be considered to be outwith their native range in this area. One record of a Leisler's bat was recorded at Balnaspirach Cottage, approximately 17km north-east of the proposed scheme, in 2010 which was likely a vagrant rather than a resident bat. Leisler's are considered migratory in Europe and transient individuals have been widely recorded. Taking the above into consideration and that the calls were recorded over one night, it is considered that the bat was a vagrant of either a parti-coloured bat or Leisler's bat as both of these species are known to be migratory in their European populations. Both the parti-coloured bat and Leisler's bats fly high above the ground, generally between 20 to 40m by parti-coloured bats and up to 70m high by Leisler's. Their flight is high and over open habitat, and	Regional

Ecological Feature	Legal/BAP Status	Baseline	Justification	Importance
		Full survey results are detailed in Appendix 11.2 (Baseline Data and Detailed Survey Methods).	they generally dive to catch their prey (Russ 2012; Racey, Raynor and Pritchard 2004). This flight strategy likely allows them to remain reasonably safe over roads and the level of WVI of the noctule, which adopts similar flight and foraging strategies, has generally been found to be low in studies undertaken in Poland (Myczko, Sparks, Skórka, Rosin, Kwieciński, Górecki and Tryjanowski 2017). Severance impacts have been found to be lower in species that forage in open habitat (Highways Agency 2011) of which parti-coloured bats and Leisler's bats both adopt this strategy. It is considered that with the bat being a likely vagrant rather than a resident population and with both species being adopting a high flying and foraging strategy, the bat will not be impacted by the proposed scheme and is therefore not considered further. All of the other species recorded within the study area during surveys and the surrounding 10km from the desk-based assessment are widespread and found throughout Scotland: common pipistrelle, soprano pipistrelle, Natterer's bat, Daubenton's bat and brown long-eared bat. Despite the widespread distribution of the latter three species, they are classed as a rarer species in Scotland (Wray, Wells, Long and Mitchell-Jones 2010) In Scotland estimated population sizes are 17,500 for Natterer's (JNCC 2013c), 40,000 for Daubenton's (JNCC 2013d) and 27,500 for brown long-eared (JNCC 2013e).	
Breeding birds	Birds of Conservation Concern (Eaton, Aebischer, Brown, Hearn, Lock, Musgrove, Noble, Stroud and Gregory 2015) (all species). Listed on the SBL (20 species). Listed in the Inverness and Nairn LBAP (20 species).	A total of 57 species were recorded within 250m of the proposed scheme, of which 43 species were considered likely to have bred. Twelve of the species recorded are red-listed and 16 are amber-listed on the Birds of Conservation Concern. Full survey results are detailed in Appendix 11.2 (Baseline Data and Detailed Survey Methods).	Of the 43 breeding species, 18 were listed as species of conservation concern, either red-listed or amber-listed whilst 20 were listed on the SBL.	Regional

Ecological Feature	Legal/BAP Status	Baseline	Justification	Importance
Schedule 1 Birds (Barn owl, red kite and quail)	Schedule 1 of the WCA. Birds of Conservation Concern (Eaton, Aebischer, Brown, Hearn, Lock, Musgrove, Noble, Stroud and Gregory 2015). Listed on the SBL (except quail). Listed in the Inverness and Nairn LBAP (except quail).	Barn owl were confirmed to have bred within 250m of the proposed scheme in 2018. Red kite and quail were recorded within 250m of the proposed scheme. Barn owl and red kite are green-listed on the Birds of Conservation Concern, however quail is amber-listed. Full survey results and records of Schedule 1 species are detailed in Appendix A11.3 (Confidential Ecology Features).	Barn owl distribution has increased, possibly due to a run of mild winters and though previously amber listed through its loss of UK range, the species was moved to the UK green list in 2015 (Eaton, Aebischer, Brown, Hearn, Lock, Musgrove, Noble, Stroud and Gregory 2015). Red kite populations within the UK have been recovering and the species has been moved from the red list to the green list in recent years (Eaton, Aebischer, Brown, Hearn, Lock, Musgrove, Noble, Stroud and Gregory 2015) Quail populations in the UK have been in decline historically and as such remain on the amber list, however the species is considered to be in partial recovery (RSPB 2019).	Regional
Otter	EPS under the Conservation (Natural Habitats &c.) Regulations 1994 (as amended in Scotland). Listed in the Highland BAP and Inverness and Nairn LBAP.	Evidence of otter was recorded on three watercourses within the study area. No otter holts or couches were recorded within the study area. Full survey results are detailed in Appendix A11.3 (Confidential Ecology Features).	Recent publications by SNH indicate that otter populations are increasing and that they are now widespread within Scotland. Locally it has been confirmed that Inverness city centre supports breeding otters (Findlay, Alexander and Macleod 2015; SNH 2015). SNH have indicated that otter populations in the east Highland area, which includes the Moray Firth, may be at or near carrying capacity (Strachan 2007).	Regional
Badger	Protection of Badgers Act 1992 (as amended). Listed in the Inverness and Nairn LBAP.	Setts were identified within the study area, as well as field signs including dung pits, prints and hair. Full survey results are detailed in Appendix A11.3 (Confidential Ecology Features).	Although considered widespread across Scotland, badgers are subject to persecution and high mortality associated with collisions on roads. Badger is also identified as a characteristic terrestrial species within the Moray Firth Natural Heritage Futures report (SNH 2002; SNH 2009).	Authority
Aquatic Species				
Freshwater fish: Cairnlaw Burn (SWF08), (Scretan Burn (SWF04) and Inshes Burn (SWF02)	Cairnlaw Burn (SWF08) has a SEPA WFD classification of Moderate for fish. European eel is an IUCN Critically Endangered species. European Commission (2007) Council Regulation (1100/2007/EC) Establishing measures for the recovery of the stock of European eel.	European eel, a critical endangered species, and brown (sea) trout, a species of high conservation value, were recorded in Cairnlaw Burn (SWF08) during the DMRB Stage 2 Assessment for the proposed scheme (Jacobs 2017).	Cairnlaw Burn (SWF08) has been found to contain fish species of high conservation value and is considered a regionally important watercourse for European eels and brown (sea) trout.	Regional

Ecological Feature	Legal/BAP Status	Baseline	Justification	Importance
	N/A for Scretan Burn (SWF04) and Inshes Burn (SWF02).	Walkover surveys for the DMRB Stage 2 Assessment for the proposed scheme (Jacobs 2017) noted suitable fish habitat in some sections of Scretan Burn (SWF04), however the presence of significant in-stream barriers would prevent the passage of migratory fish.	Barriers to migration will prevent species of conservation interest from accessing Scretan Burn (SWF04). It is therefore thought to be of limited importance for freshwater fish in the region.	Less than authority area
		No supporting habitat for fish species is present in Inshes Burn (SWF02).	Inshes Burn (SWF02) does not contain supporting habitat for fish species.	Less than authority area
Freshwater macroinvertebrates	N/A	Scretan Burn North, Scretan Burn South (SWF04) and Inshes Burn (SWF02) were assigned an overall classification of Good ecological status for macroinvertebrates. Cairnlaw Burn (SWF08) was classified as Moderate ecological status. The macroinvertebrate communities observed were indicative of watercourses of moderate to high conservation value for macroinvertebrates, based on the relative rarity of some species recovered. Full survey results are detailed in Appendix A11.2 (Baseline Data and Detailed Survey Methods).	Sampled watercourses supported a macroinvertebrate community that ranged from Moderate to Good ecological status and moderate to high conservation value. The conservation value assigned to a watercourse can be adjusted to take into account local conditions. This allows consideration of a score relative to a given area, for example a species may be nationally scarce but relatively common in a particular location (and vice versa). Several macroinvertebrate species recovered during DMRB Stage 3 surveys are classified as Regionally notable. Although this classification does not directly correlate with the overall importance categories used in this assessment, records of *P. meyeri* and *P. torva* are scarce in the area (NBN 2018a). The habitat is directly under the footprint of the proposed scheme, however, it is not atypical of habitat available throughout the area, and is therefore not considered a significant contributor to the overall macroinvertebrate habitat in the region. The stonefly *P. meyeri* was also found in both locations sampled on Scretan Burn (SWF04), suggesting it is well distributed throughout the watercourse.	Authority

11.4 Potential Impacts

Introduction

11.4.1 General potential impacts on ecological features for the proposed scheme are described below and specific potential impacts on ecological features are set out in Table 11.6. As stated in paragraph 11.2.19, only important ecological features are subject to impact assessment and features that did not meet the criteria for at least authority area importance are therefore not considered further.

11.4.2 Where a potential impact was assessed as not significant, it was not considered further, unless measures are required to comply with relevant legislation. Standard construction and design best practices would mitigate non-significant impacts.

11.4.3 Where an impact is initiated in construction, but also occurs throughout operation (e.g. permanent habitat removal), it is discussed only within operational impacts.

11.4.4 As stated in Chapter 7 (Air Quality) the Longman and Castle Stuart Bays SSSI has been assessed as not sensitive to nitrogen and therefore, impacts on this SSSI were considered not significant.

11.4.5 As stated in the A9/A96 Inshes to Smithton DMRB Stage 3 HRA (Jacobs 2019), there were no effects pathways that could lead to Likely Significant Effects on the Inner Moray Firth SPA, Inner Moray Firth Ramsar and the Moray Firth pSPA. The Moray Firth SAC was screened out of the HRA following consultation with SNH. On the 12 March 2019 SNH confirmed that they were content with the conclusions in the HRA and made no further comment.

11.4.6 Qualifying interests of the international sites are considered as wintering wildfowl and waders within this assessment and evaluated in Table 11.4. There is evidence of some of the qualifying interests (curlew, greylag geese and oystercatcher) of Inner Moray Firth SPA and Inner Moray Firth Ramsar using fields within the area of the proposed scheme for foraging, loafing and roosting (Appendix A11.2: Baseline Data and Detailed Survey Methods). However, the data suggest that the habitats within the proposed scheme area, although used by a small number of qualifying species, do not represent important functional or supporting habitats for these species. The potential disturbance to wintering waders and wildfowl (including qualifying species of the Inner Moray Firth SPA, the Moray Firth pSPA and the Inner Moray Firth Ramsar), which use the areas adjacent to, and under the footprint of, the proposed scheme has been assessed within Table 11.6.

11.4.7 The Inner Moray Firth SPA, Inner Moray Firth Ramsar and the Moray Firth pSPA are hydrologically connected to the proposed scheme via Beechwood Burn (SWF03), Scretan Burn (SWF04), Tributary of Scretan Burn (SWF05), Indirect Tributary of Scretan Burn (SWF06) and Cairnlaw Burn (SWF08). However, as protection of the water environment is a legal requirement for the proposed scheme (refer to paragraphs 11.5.8 and 11.5.9), the construction and operational design prevents effects pathways from the proposed scheme to the international sites via these connections. Therefore, there will be no impacts on the designated sites from pollution during construction or operation (Table 11.6).

11.4.8 Potential impacts are based on the baseline at the time of the assessment. Due to the mobile nature of animals and changes in distribution of plant species, surveys to update the baseline will be undertaken prior to construction.

11.4.9 The potential impacts reported in this section are also assessed in the context of the existing land use as defined in Chapter 5 (Overview of Assessment Process). It is acknowledged that land use in the area will evolve over time with cognisance of the aspirations of the local development plan, and in the future the proposed scheme is likely to be located within a landscape which has undergone substantial change; the existing land (predominantly agricultural land) becoming urbanised as a result of a series of proposed mixed-use developments. The potential cumulative impacts of the proposed scheme in-combination with other committed or reasonably foreseeable developments are assessed in Chapter 19 (Assessment of Cumulative Effects).

Construction

11.4.10 Potential construction impacts may include:

- injury or mortality of protected species due to in-stream works, vegetation removal, vehicle movements or becoming trapped in uncovered holes and pipes;
- temporary habitat loss in working areas and temporary access tracks;
- temporary habitat fragmentation due to disturbance activities and in-stream works;
- disturbance to protected species from noise, vibration, lighting and movement of vehicles and increased human activity;
- sediment release and run-off from construction works;
- temporary hydrological changes to terrestrial and aquatic habitats; and
- accidental spread of INNS (plants and animals).

Operation

11.4.11 Potential operational impacts may include:

- injury and mortality of protected species from vehicle collisions;
- fragmentation of habitats as a result of operational lighting;
- permanent loss of habitats, such as those used by protected species, and shading of aquatic habitats under the footprint of the proposed scheme;
- fragmentation and severance of habitats, especially watercourses, including loss of fish passage;
- pollution from road run-off; and
- changes in water flow conditions from run-off, structures and realignment of watercourses.

11.5 Mitigation

Introduction

11.5.1 Mitigation will follow a hierarchical approach in the following order (CIEEM 2018; SNH 2018a):

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

11.5.2 The proposed mitigation is designed to enhance and produce a net gain for biodiversity where practicable in line with policy (Scottish Government's Planning Advice Note 1/2013: Environmental Impact Assessment Revision 1.0 (Scottish Government 2017)) and guidelines (CIEEM 2018). It has also been designed to deliver biodiversity objectives included within, but not limited to:

- Highland BAP (Highland Environmental Forum 2015);
- Natural Heritage Futures (SNH 2002; 2009);
- Inverness and Nairn LBAP (Inverness and Nairn Biodiversity Group 2004);
- The Highland Council's Supplementary Guidance (The Highland Council 2013a, 2013b, 2013c); and
- Scottish Forestry Strategy (Scottish Executive 2006).

11.5.3 This section includes mitigation that aims to avoid or negate impacts on ecological features in accordance with best practice guidance and UK, Scottish and local government environmental impact, planning and sustainability policies. Where these impacts can be fully mitigated they would not be considered significant under the terms of the EIA Regulations.

11.5.4 It is expected that all impacts of negligible significance and the majority of non-significant impacts would be mitigated through the application of standard mitigation commitments and best working practice (e.g. mitigation of potential pollution impacts through adherence to standard best practice and guidelines, such as the NetRegs Guidance for Pollution Prevention and Pollution Prevention Guidance (GPP/PPG) (NetRegs 2019)) (Table 11.6).

11.5.5 Significant ecological impacts (Moderate or above) as shown in Table 11.6 are expected to be mitigated through a combination of best practice/typical mitigation methods which are set out below and in Table 11.6 and mitigation targeted to specific locations.

11.5.6 This chapter makes reference to overarching standard mitigation measures applicable across the proposed scheme ('SM' Mitigation Item references) and mitigation measures which specifically relate to ecology and nature conservation ('E' Mitigation Item references). These measures are also detailed in Chapter 20 (Schedule of Environmental Commitments).

Embedded Mitigation

11.5.7 Embedded mitigation has been developed through an iterative approach which has included discussion of proposed engineering options and their associated potential environmental impacts, as well as the recommendation of measures that limit the impacts on the water environment.

11.5.8 It is a requirement under the Water Environment and Water Services (Scotland) Act 2003 and the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) (Controlled Activities Regulations) CAR)) that pollution is managed and discharged correctly. In accordance with the aforementioned legislation, it is a requirement that any new developments with surface water drainage discharging to the water environment incorporate SuDS into the design. The proposed scheme will therefore include SuDS wetlands, filter drains and swales in order to ensure legislative compliance. Two levels of conventional SuDS treatment will be provided for all drainage catchments (see **Mitigation Item WO-04**).

11.5.9 Furthermore, under The Water Environment (Miscellaneous) Regulations 2017, which supplement The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended), it is a requirement for any construction site over 4ha to hold a CAR Construction Site Licence. This licence must include a Pollution Prevention Plan which, following a risk-based approach, would detail a management train (a hierarchy of treatment that is used in the development of SuDS) and measures to prevent pollution of the water environment. Therefore, during its construction period, the proposed scheme will be required to adopt systems to control water pollution.

11.5.10 The proposed SuDS features are described further in Chapter 13 (Road Drainage and the Water Environment) and Appendix A13.3 (SuDS and Water Quality), and likely locations of SuDS features are indicated on Figure 9.5 (accompanies Chapter 9: Landscape).

Ecological Clerk of Works

11.5.11 **Mitigation Item E-02** requires that prior to construction, a suitably qualified (or team of suitably qualified) Ecological Clerk of Works (ECoW) will be appointed by the contractor and will be responsible for implementation of the Species Protection Plans and the Habitat Management Plan (hereafter referred to as the Ecological Management Plan (refer to **Mitigation Item SM-01** as detailed in Chapter 20: Schedule of Environmental Commitments)). The ECoW will:

- provide ecological advice over the entire construction programme;
- undertake or oversee pre-construction surveys for protected species in the areas affected by the proposed scheme;

- ensure mitigation measures are implemented to avoid and reduce impacts on ecological features; and
- monitor the implementation of mitigation measures during the construction phase to ensure compliance with protected species legislation and commitments within the EIAR.

11.5.12 The ECoW will be a member of CIEEM and will have previous experience in similar ECoW roles. All ECoWs will be approved by Transport Scotland to be appropriately qualified for the role and compliance will be monitored by the employer's ecologist. The ECoW will be appointed in advance of the main construction programme commencing to ensure pre-construction surveys are undertaken and any advance mitigation measures required are implemented.

11.5.13 An employer's ecologist will check that the contractor's ECoW is suitably qualified to undertake their role and will audit the contractual obligations with regards to the ecological safeguarding and ecological mitigation requirements.

Construction

11.5.14 Standard mitigation commitments have been produced which set out the actions the contractor is required to take during the construction phase of the proposed scheme to avoid or reduce environmental impacts. Some measures detailed are not mitigation in isolation, but their implementation for regulatory/legal compliance purposes will inform the scope of further mitigation and licensing where required (e.g. pre-construction surveys and monitoring). These define the standard construction mitigation required to achieve the objectives of the mitigation and those relevant to Ecology and Nature Conservation are detailed in Table 11.6 below.

11.5.15 The standard mitigation commitments include the requirement for the contractor to develop a management system to structure the implementation of the mitigation measures. This will include a Construction Environmental Management Plan (CEMP) **(Mitigation Item SM-01** as detailed in Chapter 20: Schedule of Environmental Commitments).

11.5.16 In accordance with **Mitigation Item E-01**, pre-construction surveys will be undertaken to verify and, where required, update the baseline ecological conditions set out in the EIAR. The scope of the pre-construction surveys will be confirmed with SNH prior to them being undertaken.

11.5.17 Certain activities during construction will trigger the need for a protected species derogation licence **(Mitigation Item E-09)** under relevant legislation. Structures or places which a protected species uses for shelter that are under the footprint of the proposed scheme will be destroyed under licence following consultation with SNH. Works taking place within a certain distance may disturb protected species when occupying a structure or place of shelter and may require a derogation licence. Suggested protection zones for each species are detailed below in Table 11.5 in line with best practice guidance (SNH Protected Species Advice for Developers notes, SNH 2019b; SNH 2019c; SNH 2019d) and professional judgement. Indicative distances have been provided by SNH, with the exception of bats, for which a note is provided. The need for a derogation licence for work taking place within this distance will be assessed by an ecologist.

Table 11.5: Protection Zones for Protected Species

Species	Non-breeding Protection Zone	Protection Zone of a Proven Breeding Location	Suggested Protection Zone for Specific Activities**
Otter	30m	200m	100m for non-breeding locations 200m for proven breeding locations
Badger	30m	30m	100m
Bats*	30m	30m	
Atlantic salmon Lamprey (all species)	N/A	N/A	

*In the absence of a published distance for bats, professional judgement has been used to determine an appropriate protection zone.
**Specific activities include high noise/vibration activities such as pile driving or blasting.

11.5.18 Based on the current baseline, no derogation licences will be required. However, should protected species be identified at a later stage within the protection zones presented in Table 11.5, derogation licences will be required.

11.5.19 In accordance with **Mitigation Item SM-01** (as detailed in Chapter 20: Schedule of Environmental Commitments), an Ecological Management Plan will be prepared. This will be prepared and developed by the contractor from the mitigation and environmental commitments identified in this assessment (Table 11.6), for example:

- details of proposed protection measures and exclusion zones to avoid any unnecessary encroachment into adjoining areas of nature conservation;
- a programme for undertaking pre-construction surveys prior to and during construction;
- restrictions on the timing of construction works, for example during site clearance and works within watercourses;
- appropriate watching briefs during construction;
- relocation or translocation of species;
- compliance with guidelines provided in 'BS 5837: 2012 Trees in relation to design, demolition and construction – recommendations' (British Standards Institute 2012) such as establishment of Root Protection Areas (RPA); and
- replacement of trees lost that were intended to be retained which are felled or die as a result of construction works.

11.5.20 The Ecological Management Plan will be prepared to ensure that essential mitigation strategies required for safeguarding protected species and habitats are implemented as part of the contract. These will be updated as appropriate if any licences and additional mitigation measures are required to avoid potential breaches of conservation legislation arising from mortality or disturbance; or amendments to the agreed mitigation are identified through pre-construction surveys or watching briefs. The plans will be developed in consultation with relevant stakeholders including SNH.

11.5.21 Adherence to the Ecological Management Plan will also mitigate for any potential animal welfare issues during construction.

11.5.22 It will be the contractual responsibility of the contractor to ensure that mitigation is implemented during the works and that all relevant licences, should they be required, are in place prior to commencement of works.

11.5.23 No mitigation is required for non-significant impacts at construction (or operation). However, Mitigation Items which are to be applied across the proposed scheme will also reduce the effects of these non-significant impacts. These have been referenced against the relevant ecological features in Table 11.6.

Operation

Mitigation for Habitats

11.5.24 The loss of habitats will be replaced through landscape and ecological planting (**Mitigation Item E-36**) as detailed in Figure 9.5 (accompanies Chapter 9: Landscape). Planting is designed to replace what would be lost by the proposed scheme.

Mitigation for Protected Species

11.5.25 The provision of suitable crossing structures (**Mitigation Item E-29**) to reduce barrier effects and collision risk, and also maintain, and where possible enhance, habitat connectivity, are detailed in this assessment. The locations of these crossing structures, which include dry mammal underpasses (DMUs) and culverts with mammal provision, are shown on Figure 9.5. The structures offer multi-species benefits and will provide passage for otter and badger amongst others.

11.5.26 Otter and badger fencing will be provided to prevent access on the carriageway and will be positioned to direct animals to safe crossing points along the proposed scheme (**Mitigation Item E-30**). Otter fencing has been proposed at watercourse crossings with known otter presence and/or suitable habitat, and badger fencing has been proposed at key areas adjacent to known setts and locations of multiple WVIs. The fencing specifications will follow SNH and DMRB guidance (SNH 2019b; SNH 2019c; Highways Agency, Scottish Government, Welsh Assembly Government and The Department of Regional Development Northern Ireland 1999) and will be designed to prevent animals being trapped on the road, tie-in to crossing structures where possible and where this is not possible, designed to direct animals away from the carriageway. The indicative location of mammal fencing is shown on Figure 9.5.

Mitigation for Deer

11.5.27 Deer may collide with vehicles using the proposed scheme during operation. The contractor shall undertake a risk assessment, taking account of Transport Scotland's deer management planning, the Trunk Road Operating Contractor's deer management plan and SNH's 'Code of Practice on Deer Management' (SNH 2012). The contractor shall take appropriate measures such as erection of deer fencing as to avoid increasing the risk of deer collisions on the road and to protect new planting areas from browsing (**Mitigation Item E-35**).

Monitoring

11.5.28 The contractor's ECoW will be responsible for ensuring compliance with protected species legislation and commitments stated in this assessment during construction. Compliance will be monitored by the employer's ecologist and the effectiveness of the mitigation will be interpreted and recorded to enable a review of mitigation measures for future projects.

11.5.29 Post-construction monitoring will be undertaken in accordance with Table 11.6, the Ecological Management Plan and any derogation licences required for the proposed scheme. The monitoring aims and objectives will follow the published SNH Commissioned Report 1003, on Developing a mitigation monitoring approach for the A9 and A96 dualling projects (Macdonald-Smart 2017). The objective of the monitoring will be to determine the effectiveness of the mitigation to help inform future projects, and also whether further mitigation, maintenance or changes in mitigation approach are required to maintain the conservation status of ecological features affected. Post-construction monitoring will be the responsibility of the employer's ecologist and, in the longer term, of the relevant trunk road operating company.

11.6 Residual Impacts

11.6.1 A summary of residual impacts is set out in Table 11.6 below.

11.6.2 The locations of potential impacts are referenced to the 'links' of the proposed scheme as detailed in Chapter 4 (The Proposed Scheme) and shown on Figure 4.1. For ease of reference these include:

- Culloden Road to Cradlehall Roundabout (Link 1 – ch0 to ch306);
- Cradlehall Roundabout to Eastfield Way Roundabout (Link 2 - ch0 to ch644);
- Eastfield Way Roundabout to Inverness Retail and Business Park (Link 3 – ch0 to ch693);
- Eastfield Way Roundabout to Smithton Junction (Link 4 – ch0 to ch1113);
- Cradlehall Roundabout to Inverness Campus (Link 5 – ch0 to ch289); and
- Castlehill Road Tie-in (Link 6: ch0 to ch208).

11.6.3 Mitigation measures detailed in the table make reference to mitigation items noted in the following chapters of this EIAR, Chapter 8 (Noise and Vibration) (ref NV), Chapter 9 and 10 (Landscape and Visual respectively) (ref LV), Chapter 13 (Road Drainage and the Water Environment) (ref WC or WO).

Table 11.6: Summary Impact Assessment for Ecological Features

Ecological Feature	Importance	Impact	Location of Impact	Effect	Pre-mitigation Impact Descriptor & Significance	Mitigation Item	Summary of Residual Impact and Significance (post-mitigation)
Construction							
Moray Firth SAC Inner Moray Firth SPA Inner Moray Firth Wetland of International Importance (Ramsar) Moray Firth pSPA Longman and Castle Stuart Bays SSSI	No construction impacts						
Watercourses: Cairnlaw Burn (SWF08), Scretan Burn (SWF04), Inshes Burn (SWF02)	Regional	Runoff and release of sediment from construction works including chemical and hydrocarbon loads from accidental spillage.	Cairnlaw Burn (SWF08): • ch75 of Link 4; and • ch850 of Link 4.	Pollution of the watercourse leading to reduced water quality and increased deposition resulting in modified submerged habitat. Depending on the magnitude of the pollution event, there could be permanent effects on the watercourse and on the viability of populations resident aquatic species. This will cause a short-term, negative and reversible effect.	medium (Significant)	Measures to control pollution through compliance with **Mitigation Item WC-03** and **Mitigation Item WC-07**.	No significant residual impacts predicted.
		Dewatering during construction activities		Temporary changes to hydrology leading to reduced habitat availability.	low (Not significant)	Mitigated through compliance with **Mitigation Item E-03**: During construction, the extent of areas affected by culverts, watercourse realignment and dewatering will be minimised as far as practicable. Best practice guidance will be adhered to when working within watercourses likely to contain salmonids (SEPA 2010; Scottish Government 2012). In-channel works will avoid the salmonid spawning and egg incubation period, such that all works will be undertaken between May and September inclusive or as agreed with relevant stakeholders. During construction, reasonable precautions will be undertaken to avoid/reduce in-channel works and translocation of channel substrates. During construction, fish are to be removed and relocated from channels to be dewatered for the construction of culverts and channel realignments, in accordance with established guidance. Where watercourse realignments are unavoidable, habitat creation and enhancement have been incorporated into designs through the inclusion of meander bends and riparian zones, where appropriate. Design and construction of new culverts and extended or upgraded culverts, will abide by the relevant guidance provided in the following, to maintain full habitat connectivity by ensuring a suitable flow regime and substrate composition under the footprint of all culverts: • SEPA Good Practice Guidelines for Temporary Construction Methods (SEPA 2009); • SEPA Good Practice Guide for River Crossings (SEPA 2010); • SEPA Position Statement (SEPA 2015b); • DMRB Design of Outfalls and Culvert Details (Highways Agency, Scottish Executive, Welsh Assembly Government and The Department for Regional Development Northern Ireland 2004); and • Construction Industry Research and Information Association (CIRIA) Culvert Design and Operational Guide (C689) (CIRIA 2010). The watercourse substrate in the working area will be removed and stored for reuse to allow the maintenance of natural bed substrates during post-construction operation phase, as per best practice guidance.. Where this is not possible imported materials for use as rip rap or stream bed will be appropriate for the location e.g. correct pH. The material will be free of invasive plants and animals and will be placed in such a way so as to maintain or improve the pre-construction fish and invertebrate habitat wherever possible. During construction within and around watercourses, the following GPPs/PPGs will be adhered to (NetRegs 2019) (**Mitigation Item E-04**) - PPG 1, GPP 2, GPP 5, GPP 21 and GPP 22. The guidance includes the following mitigation measures: • surface and foul water will be appropriately drained and stored with these control measures in place before earthworks commence; chemicals, oils and fuels will be kept safely stored and away from drainage systems and waste will be appropriately managed;	No significant residual impacts predicted.

Ecological Feature	Importance	Impact	Location of Impact	Effect	Pre-mitigation Impact Descriptor & Significance	Mitigation Item	Summary of Residual Impact and Significance (post-mitigation)
						• plant and machinery must not be fuelled within 10m of watercourses or drainage systems, or as advised by the ECoW; • sites will be restored fully on completion of works; and • emergency procedures and spillage kits must be available when working near watercourses or drainage systems, and construction staff must be familiar with emergency procedures. Details of how this will be executed will be listed in the CEMP (**Mitigation item SM-01**).	
	Authority	Runoff and release of sediment from construction works including chemical and hydrocarbon loads from accidental spillage.	Scretan Burn (SWF04): • ch150 of Link 2; • ch300 of Link 3; and • ch30 of Eastfield Way Roundabout to Drumrosach Bridge Non-motorised Users (NMU) Link Tributary of Scretan Burn (SWF05): • ch530 of Link 3; and, • ch550 of Link 2. Inshes Burn (SWF02): • 30m north of ch0 on A9	Pollution of the watercourse leading to reduced water quality and increased deposition resulting in modified submerged habitat. Depending on the magnitude of the pollution event, there could be permanent effects on the watercourse and on the viability of populations resident aquatic species. This will cause a short-term, negative and reversible effect.	medium (Significant)	Measures to control pollution through compliance with **Mitigation Item WC-03** and **Mitigation Item WC-07**.	No significant residual impacts predicted.
Wintering birds (wildfowl) (including SPA/Ramsar qualifying interests)	International	Noise, vibration and light spill associated with construction related activities.	Agricultural land adjacent to: • ch450 of Link 2 to Eastfield Way Roundabout; • ch300 to ch500 of Link 3; • Eastfield Way Roundabout to ch50 of Link 4; and • ch200 to ch850 of Link 4.	Disturbance leading to displacement of wildfowl from areas used for foraging, loafing and overnight roosting (December to March (inclusive)). This may result in additional energy expenditure and loss of conditioning. This effect would be short-term and negative.	low (Not significant)	No mitigation is required for this non-significant impact; however, the following measures that will be applied across the proposed scheme would further reduce this impact: • plant and personnel will be constrained to a prescribed working corridor through the use of temporary barriers to minimise the damage to habitats and potential direct mortality and disturbance to animals located within and adjacent to the proposed scheme working corridor. The working corridor may only be altered in agreement with the ECoW (**Mitigation Item E-05**); • a construction lighting plan and method statement will be developed by the contractor (**Mitigation Item E-06**). The plan, as part of the Ecological Management Plan, will detail specific mitigation requirements taking into account guidance on lighting (e.g. Institution of Lighting Professionals (2011) and The Royal Commission on Environmental Pollution (2009)). The construction lighting design will take into account the need to avoid illuminating sensitive bird habitats in locations such as: adjacent to watercourses; along woodland edges; and where there is known activity identified through pre-construction ecological surveys (refer to **Mitigation Item E-01**). Where this is not possible the contractor will agree any exceptions with the ECoW; and • areas of key wintering bird habitat adjacent to the proposed scheme have been identified. It is recommended that these areas are avoided during construction of the proposed scheme and site compounds are located outwith these areas in order that they are still available for foraging and roosting by the bird species concerned (**Mitigation Item E-07**). Pre-construction surveys (**Mitigation Item E-01**) may be required to update the baseline if land use in the area surrounding the proposed scheme change significantly.	Impact was not significant prior to mitigation and therefore there is no residual impact.
Wintering birds (waders) (including SPA/Ramsar qualifying interests)	International	Noise, vibration and light spill associated with construction related activities.	Agricultural land adjacent to: • ch300 to ch500 of Link 3; and • ch50 to ch850 of Link 4.	Disturbance leading to displacement of waders from areas used for foraging, loafing, diurnal high tide roosting and overnight roosting (October to March (inclusive)). This may result in additional energy expenditure and loss of conditioning. This effect would be short-term and negative.	low (Not significant)	No mitigation is required for this non-significant impact; however, the following measures that will be applied across the proposed scheme would further reduce this impact: • compliance with **Mitigation Item E-01**, **Mitigation Item E-05**, **Mitigation Item E-06** and **Mitigation Item E-07**.	Impact was not significant prior to mitigation and therefore there is no residual impact.

Ecological Feature	Importance	Impact	Location of Impact	Effect	Pre-mitigation Impact Descriptor & Significance	Mitigation Item	Summary of Residual Impact and Significance (post-mitigation)
Bats	Regional	Construction related activities including vegetation clearance.	All woodland habitat throughout the proposed scheme.	Direct mortality of an EPS during removal of potential roosting habitat. This effect on overall populations would be long-term, reversible and negative.	medium (Significant)	Mitigated through compliance with **Mitigation Item E-01**. Any tree felling will be carried out by experienced contractors to reduce direct mortality of protected species according to agreed felling methods between contractors and the ECoW (**Mitigation Item E-08**). Mitigated through compliance with **Mitigation Item E-05**. The contractor will obtain and comply with the requirements of any protected species derogation licences in respect of works necessary to construct the proposed scheme that are likely to breach applicable conservation legislation (**Mitigation Item E-09**).	No significant residual impacts predicted.
		Temporary obstruction of commuting habitat.		Severance of habitat, and diversion of individuals away from existing commuting routes, potentially resulting in greater use of less suitable crossing points. This effect would be short-term, reversible and negative.	low (Not significant)	No mitigation is required for this non-significant impact.	No significant residual impacts predicted.
		Noise, vibration and light spill associated with construction related activities.		Disturbance of an EPS, which could lead to the abandonment of roost sites and increased energy expenditure during roosting periods. Could also cause avoidance of commuting routes and foraging areas. This effect would be short-term and negative.	low (Not significant)	No mitigation is required for this non-significant impact; however, the following measures that will be applied across the proposed scheme would further reduce this impact: • compliance with **Mitigation Item E-01**, **Mitigation Item E-09, Mitigation Item LV-04** and **Mitigation Item NV-02**; which is primarily aimed at human receptors, but measures detailed will also benefit ecological features, which would reduce the effect of this impact; and • a construction lighting plan and method statement will be developed by the contractor (**Mitigation Item E-06**). The plan, as part of the Ecological Management Plan, will detail specific mitigation requirements taking into account guidance on lighting (e.g. Institution of Lighting Professionals and Bat Conservation Trust (2018); Institution of Lighting Professionals (2011) and The Royal Commission on Environmental Pollution (2009)). The construction lighting design will take into account the need to avoid illuminating sensitive bat habitats in locations such as: adjacent to watercourses; along woodland edges; and where there is known activity identified through pre-construction ecological surveys (refer to **Mitigation Item E-01**). Where this is not possible the contractor will agree any exceptions with the ECoW.	Impact was not significant prior to mitigation and therefore there is no residual impact.
Breeding birds	Regional	Construction related activities, including vehicle movement and vegetation clearance.	Throughout the proposed scheme.	Direct mortality and disturbance due to vegetation clearance during the breeding season. Mortality of individuals would be a permanent and disturbance would be long-term and negative due to implications from failure to reproduce. However, this effect is unlikely to occur in sufficient numbers to affect the wider population(s) and would be long-term, reversible and negative.	medium (Significant)	Tree felling and vegetation clearance to be reduced as far as practicable and undertaken outside the core bird nesting season (1 March to 31 August) to avoid damage or destruction of occupied nests or harm to breeding birds. If this cannot be achieved, vegetation clearance undertaken within the core bird nesting season will be preceded by a nesting bird inspection by a suitably experienced ecologist no more than 24 hours prior to works commencing. If any nesting birds are identified during the survey, they will be left in situ until the nest is no longer active. Alternative approaches to the work will need be proposed e.g. leaving an exclusion zone around the nest to avoid disturbance. All cleared vegetation will be rendered unsuitable for nesting birds, for example, by covering or chipping depending on the end purpose of the vegetation or will be removed from the works area (**Mitigation Item E-10**). Mitigated through compliance with **Mitigation Item E-05** and **Mitigation Item E-08**.	No significant residual impacts predicted.
		Noise, vibration and light spill associated with construction related operations including earth movements throughout the proposed scheme.		Disturbance leading to avoidance of habitats and displacement of population(s). This effect would be short-term and reversible.	medium (Significant)	Mitigated through compliance with **Mitigation Item E-01**, **Mitigation Item E-02**, **Mitigation Item E-05** and **Mitigation Item E-06**.	No significant residual impacts predicted.
		Temporary loss of habitat to accommodate construction.		Fragmentation and displacement through temporary loss of habitat. This effect would be short-term, reversible and negative.	low (Not significant)	No mitigation is required for this non-significant impact.	No significant residual impacts predicted.

Ecological Feature	Importance	Impact	Location of Impact	Effect	Pre-mitigation Impact Descriptor & Significance	Mitigation Item	Summary of Residual Impact and Significance (post-mitigation)
Schedule 1 Birds (Barn owl, red kite and quail)	Regional	Noise, vibrations and light spill associated with construction related activities.	For locations see Appendix A11.3 (Confidential Ecology Features).	Disturbance of Schedule 1 species which could influence breeding success, feeding behaviour and if disturbance becomes continuing it could lead to abandonment of nests during that season. This effect would be long-term and negative.	medium (Significant)	Mitigated through compliance with **Mitigation Item E-01**, **Mitigation Item E-02**, **Mitigation Item E-05** and **Mitigation Item E-06**. If barn owls are nesting in the known locations or a new nest is identified, the following measures to reduce disturbance, as detailed by Shawyer (2011), will be adhered to: • a suitable protection zone will be placed around the nest. Construction work within the protection zone will not take place between 1 March to 31 August (**Mitigation Item E-11**); • construction work near barn owl nests should avoid taking place during the hours of darkness when barn owls are largely active (**Mitigation Item E-12**); • works should be programmed so that the activity is progressively increased over a period of days to give the resident birds the opportunity to acclimatise to the new event (**Mitigation Item E-13**); and • if deemed necessary, the nest will be visually screened, for example, by the use of high fine mesh netting which will prevent encroachment and shield birds visually from sudden changes in activity levels (**Mitigation Item E-14**).	No significant residual impacts predicted.
		Temporary loss of habitat to accommodate construction.		Fragmentation and displacement through temporary loss of habitat. This effect would be short-term, reversible and negative.	low (Not significant)	No mitigation is required for this non-significant impact.	No significant residual impacts predicted.
Otter	Regional	Construction related activities including vehicle movement, culvert and watercourse crossing construction and creation of excavations including those for Sustainable Drainage Systems (SuDS) features.	For locations see Appendix A11.3 (Confidential Ecology Features).	Direct mortality of individuals moving across site from collisions or entrapment in uncovered holes, pipes or machinery. Permanent negative effect on an individual level but is unlikely to occur in sufficient numbers to affect the wider population and would therefore be long-term, reversible and negative.	medium (Significant)	Mitigated through compliance with **Mitigation Item E-05**. Trenches, holes and pits will be kept covered at night or provide a means of escape for mammals that may become entrapped. Gates to compound areas will be designed to prevent mammals from gaining access and will be closed at night (**Mitigation Item E-15**). Temporary mammal-resistance fencing will be provided around construction compounds (**Mitigation Item E-16**). Construction compounds, storage areas, temporary access tracks etc. (except for culvert, bridge and outfall works) will be at least 10m from watercourse banks (**Mitigation Item E-17**).	No significant residual impacts predicted.
		Noise, vibrations and light spill associated with construction related activities including embankment and drainage works.		Disturbance of an EPS, leading to its avoidance of key places of shelter and rest, and fragmentation through temporary loss of habitat; but not at a level that will cause declines in population as the species is widespread in the area. This effect would be negative and short-term.	medium (Significant)	Mitigated through compliance with **Mitigation Item E-09**. A construction lighting plan and method statement will be developed by the contractor (**Mitigation Item E-06**). The plan, as part of the Ecological Management Plan, will detail specific mitigation requirements taking into account guidance on lighting (e.g. Institution of Lighting Professionals (2011) and The Royal Commission on Environmental Pollution (2009)). The construction lighting design will take into account the need to avoid illuminating sensitive otter habitats in locations such as: adjacent to watercourses and where there is known activity identified through pre-construction ecological surveys (refer to **Mitigation Item E-01**). Where this is not possible the contractor will agree any exceptions with the ECoW. Severance and fragmentation of habitat used by otter will be reduced during construction by retention of commuting routes, for example constructing culverts with mammal provision and dry mammal underpasses early in the construction process (**Mitigation Item E-18**). If resting sites are found at pre-construction (**Mitigation Item E-01**), piling/drilling will not be undertaken within 100m of a non-breeding resting site, 200m of a proven breeding resting site or during the hours of darkness (**Mitigation Item E-19**). If resting sites are found at pre-construction (**Mitigation Item E-01**), installation of screening (e.g. chestnut paling) to segregate resting sites from construction areas for the duration of works and daily inspections of resting sites, as determined by the ECoW (**Mitigation Item E-20**). Compliance with **Mitigation Item LV-04** and **Mitigation Item NV-02** which are primarily aimed at human receptors, but measures detailed will also benefit ecological features.	No significant residual impacts predicted.

Ecological Feature	Importance	Impact	Location of Impact	Effect	Pre-mitigation Impact Descriptor & Significance	Mitigation Item	Summary of Residual Impact and Significance (post-mitigation)
		Runoff from construction works including sediment and chemical and hydrocarbon loads from accidental spillage.		Pollution of watercourse resulting in reduced prey availability, leading to a decline in foraging habitat quality. This effect would be, negative, short-term and reversible.	medium (Significant)	Mitigated through compliance with **Mitigation Item WC-03** and **Mitigation Item WC-07**.	No significant residual impacts predicted.
Badger	Authority	Construction related activities including vehicle movement.	Throughout the proposed scheme. For survey results see Appendix A11.3 (Confidential Ecology Features).	Potential direct injury or mortality of individuals moving across site from collisions or entrapment in uncovered holes, pipes or machinery. Permanent negative effect on an individual level but is unlikely to occur in sufficient numbers to affect the wider population and would therefore be long-term, reversible and negative.	medium (Significant)	Mitigated through compliance with **Mitigation Item E-05**, **Mitigation Item E-15** and **Mitigation Item E-16**.	No significant residual impacts predicted.
		Noise, vibration and light spill associated with construction related activities.		Temporary disturbance of badgers leading to a change in the distribution of local population(s). This effect would be short-term, reversible and negative.	low (Not significant)	No mitigation is required for this non-significant impact; however, the following measures that will be applied across the proposed scheme would further reduce this impact: • compliance with **Mitigation Item E-09** and **Mitigation Item E-18** would reduce the effect of this impact; and • a construction lighting plan and method statement will be developed by the contractor (**Mitigation Item E6**). The plan, as part of the Ecological Management Plan, will detail specific mitigation requirements taking into account guidance on lighting (e.g. Institution of Lighting Professionals (2011) and The Royal Commission on Environmental Pollution (2009)). The construction lighting design will take into account the need to avoid illuminating sensitive badger habitat in locations where there is known activity identified through pre-construction ecological surveys (refer to **Mitigation Item E-01**). Where this is not possible the contractor will agree any exceptions with the ECoW.	Impact was not significant prior to mitigation and therefore there is no residual impact.
		Temporary loss of badger habitat to accommodate construction.		Fragmentation through temporary loss of habitat. This effect would be short-term, reversible and negative.	low (Not significant)	No mitigation is required for this non-significant impact.	No significant residual impacts predicted.
Freshwater fish: Habitat availability, population and water quality.	Regional	Pollution of watercourses that support brown (sea) trout of mixed age classes and European eel, during construction related activities (including operational run-off).	Cairnlaw Burn (SWF08): • ch75 of Link 4; and • ch850 of Link 4.	Temporary disturbance leading to a change in the distribution of local population(s). This effect would likely be short-term, reversible and negative.	low (Not significant)	Mitigated through compliance with **Mitigation Item E-04**.	Impact was not significant prior to mitigation and therefore there is no residual impact.
	Regional	Temporary loss of habitat and habitat fragmentation through dewatering during construction activities.	Cairnlaw Burn (SWF08): • ch75 of Link 4; and • ch850 of Link 4.	Temporary disturbance leading to a change in the distribution of population(s). Temporary loss of habitat and changes in hydrology, leading to reduced habitat availability. Fragmentation of the watercourse could prevent fish from accessing important habitats. This will be a short-term, reversible effect as fish will recolonise the area are construction is completed.	low (Not significant)	Mitigated through compliance with **Mitigation Item E-03** and **Mitigation Item E-04**.	Impact was not significant prior to mitigation and therefore there is no residual impact.
	Regional	Disturbance to fish populations during construction activities, including noise, vibration and lighting.	Cairnlaw Burn (SWF08): • ch75 of Link 4; and • ch850 of Link 4.	Disturbance leading to avoidance of habitats. This will be a short-term, reversible effect.	low (Not significant)		Impact was not significant prior to mitigation and therefore there is no residual impact.
	Regional	Mortality of fish during dewatering and instream works associated with the proposed scheme.	Cairnlaw Burn (SWF08): • ch75 of Link 4; and • ch850 of Link 4.	Direct mortality of fish including brown/sea trout and European eel. This will be a permanent and negative effect at the individual level but unlikely to have a significant effect at the population level.	medium (Significant)	Measures to remove and relocate fish prior to works commencing and the application of best practice guidance (**Mitigation Item E-03** and **Mitigation Item E-04)** will minimise the direct mortality of fish.	A minor residual impact is predicted. This is not likely to be significant if the suggested mitigation is implemented.

Ecological Feature	Importance	Impact	Location of Impact	Effect	Pre-mitigation Impact Descriptor & Significance	Mitigation Item	Summary of Residual Impact and Significance (post-mitigation)
Macroinvertebrates: Macroinvertebrate community composition and habitat availability.	Authority	Construction activities for the proposed scheme could result in runoff of contaminants or sediments.	Cairnlaw Burn (SWF08): • ch75 of Link 4; and • ch850 of Link 4. Scretan Burn (SWF04): • ch150 of Link 2; • ch300 of Link 3; Inshes Burn (SWF02): • 30m north of ch0 on the A9	Pollution leading to reduced water quality. Inputs of fine sediments can smother macroinvertebrate habitat and affect the gills of some species. This will cause a short-term, reversible effect.	low (Not significant)	Mitigated through compliance with **Mitigation Item E-04**.	Impact was not significant prior to mitigation and therefore there is no residual impact.
	Authority	Dewatering during construction activities	Cairnlaw Burn (SWF08): • ch75 of Link 4; and • ch850 of Link 4. Scretan Burn (SWF04): • ch150 of Link 2; and • ch300 of Link 3.	Temporary loss of a small area of habitat and changes to hydrology leading to reduced habitat availability. The impacts are expected to be localised and this will be a short-term, reversible effect.	low (Not significant)	Mitigated through compliance with **Mitigation Item E-03** and **Mitigation Item E-04**.	Impact was not significant prior to mitigation and therefore there is no residual impact.
	Authority	In-stream construction works such as inserting/extending culverts, associated with the proposed scheme.	Cairnlaw Burn (SWF08): • ch75 of Link 4; and • ch850 of Link 4. Scretan Burn (SWF04): • ch150 of Link 2; and • ch300 of Link 3.	Direct mortality of individuals will have a permanent and negative effect, although there is not likely to be a significant impact on the wider population in the watercourse.	low (Not significant)		Impact was not significant prior to mitigation and therefore there is no residual impact.
INNS	n/a	Transfer of INNS during construction.	Throughout the proposed scheme.	Reduction in biodiversity, through loss of habitat, reduction in species richness and a loss of species which the habitat(s) support. Negative effect which could be permanent without management, with the potential for the effects to spread beyond the scope of the initial impact area.	high (Significant)	Mitigated through compliance with **Mitigation Item E-21:** The contractor will describe within the CEMP (**Mitigation Item SM-01**) the biosecurity strategy to be implemented for the appropriate treatment of invasive non-native species (INNS). The strategy will set out appropriate construction, handling, treatment and disposal procedures to prevent the spread of INNS in line with recognised best practice.	Impact was not significant prior to mitigation and therefore there is no residual impact.
Operation							
Moray Firth SAC	No operational impacts.						
Inner Moray Firth SPA							
Moray Firth pSPA							
Inner Moray Firth Ramsar site							
Longman and Castle Stuart Bays SSSI							
Watercourses: Cairnlaw Burn (SWF08)	Regional	Pollution from road runoff	Cairnlaw Burn (SWF08): • ch75 of Link 4; and • ch850 of Link 4.	Increased runoff volumes and contaminants leading to decreased water quality of WFD classified watercourse.	medium (Significant)	Measures to prevent pollution of water features during operation, SEPA PPG/GPP 1, 5, 21, 22 and 26 (NetRegs 2019 will be adhered to (**Mitigation Item E-22)**. Road surface runoff will be subject to treatment via SuDS. See **Mitigation Item WO-04** for more details. Likely locations of SuDS features are indicated on Figure 9.5.	No significant residual impacts predicted.
		Culverts associated with the proposed scheme may alter flows and substrate conditions, which may fragment the watercourse.		Channel modifications resulting in changes in substrate movement and scouring of substrates at the culvert outlet. This would be a permanent, negative effect.	high (Significant)	Channel modifications and structures to be designed in accordance with best practice guidance (**Mitigation Item E-03**).	No significant residual impacts are predicted.

Ecological Feature	Importance	Impact	Location of Impact	Effect	Pre-mitigation Impact Descriptor & Significance	Mitigation Item	Summary of Residual Impact and Significance (post-mitigation)
Scretan Burn (SWF04), Inshes Burn (SWF02)	Authority	Pollution from road runoff	Scretan Burn (SWF04): • ch150 of Link 2; and • ch300 of Link 3. Inshes Burn (SWF02): • 30m north of ch0 on A9	Increased runoff volumes and contaminants leading to decreased water quality.	medium (Significant)	Mitigated through compliance with **Mitigation Item E-22**. Road surface runoff will be subject to treatment via SuDS. See **Mitigation Item WO-04** for more details. Likely locations of SuDS features are indicated on Figure 9.5.	No significant residual impacts are predicted.
		Culverts associated with the proposed scheme may alter flows and substrate conditions, which may fragment the watercourse.	Scretan Burn (SWF04): • ch30 of Eastfield Way Roundabout to Drumrosach Bridge NMU Link	Channel modifications resulting in changes in substrate movement and scouring of substrates at the culvert outlet. This would be a permanent, negative effect.	medium (Significant)	Mitigated through compliance with **Mitigation Item E-03**.	No significant residual impacts are predicted.
Wintering birds (waders and wildfowl) (including SPA/Ramsar qualifying interests)	International	Permanent loss of preferred wader and wildfowl habitat beneath the footprint of the proposed scheme.	Agricultural land directly beneath the footprint of the proposed scheme between ch50 to ch850 of Link 4.	Loss of a small area of suitable foraging habitat and refuge areas during high tide periods. This would result in displacement of waders and wildfowl. This effect would be long-term and negative.	low (Significant)	The loss of wintering bird habitat (agricultural land) will be reduced through the landscape and ecological mitigation planting design (**Mitigation Item E-23**). The landscape and ecological mitigation planting design will minimise additional land-take for planting at the locations identified, with a particular focus on maintaining areas of semi-improved grassland (Figure 9.5). Habitat enhancement will be provided surrounding SuDS areas (**Mitigation Item E-24**). This will incorporate areas of short vegetation to provide suitable habitat for waders to use as alternative high tide roosts.	No significant residual impacts predicted.
		Fragmentation of preferred wader and wildfowl habitat beneath the footprint of the proposed scheme.			low (Not significant)	No mitigation is required for this non-significant impact; however, the following measures that will be applied across the proposed scheme would further reduce this impact: • compliance with **Mitigation Item E-23** and **Mitigation Item E-24**.	Impact was not significant prior to mitigation and therefore there is no residual impact.
Bats	Regional	Loss of foraging and commuting habitat under the footprint of the proposed scheme.	• ch150 and 560 of Link 2; • ch40, 300 and 540 of Link 3; • ch70, 250, 580, 850 and 1080 of Link 4; and • Lighting on A9 south of Inshes Overbridge.	Fragmentation and diversion of individuals away from existing commuting routes, potentially resulting in greater use of less suitable crossing points. Reduced availability of foraging resources. This effect would be long-term and negative.	medium (Significant)	Fragmentation of habitat will be reduced during operation by retention of commuting routes and avoiding lighting of key bat commuting and foraging habitats (**Mitigation Item E-25**). Where lighting is essential, guidance on bats and artificial lighting should be taken into consideration (Institution of Lighting Professionals and Bat Conservation Trust 2018) so movement between areas of habitat can be maintained. Light Emitting Diodes (LED) luminaires providing a directional light source with minimal light spillage shall be used where possible. A warm white spectrum (ideally <2700 Kelvin) should be considered to reduce the blue light component. Luminaires should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats. Luminaires should be mounted on the horizontal and with an upward light ratio of 0%. In addition, bat habitat loss and fragmentation of existing habitat will be mitigated by woodland retention and landscape and ecological planting as shown on Figure 9.5 (**Mitigation Item E-26**). This will include: • planting around SuDS features to create suitable habitat for foraging bats; and • planting and woodland retention designed as hop-overs to encourage use of crossing points using higher flight lines so movement between areas of habitat can be maintained and to prevent vehicle collisions. Post-construction monitoring to determine the effectiveness of the hop-overs will be undertaken.	During the growth phase of landscape and ecological planting, a negative residual impact is predicted due to loss and fragmentation of habitat. However, this impact would be temporary in nature and once cover is established no significant residual impacts are predicted.
		Loss of potential roost habitat under the footprint of the proposed scheme.	Woodland habitat lost throughout the proposed scheme.	Loss of trees with potential for roosts in woodland and along tree lines, including potential roosts of higher conservation value. Loss of roosts would be a permanent effect. However, depending on the nature of the roost, bats may be able to use alternative roost sites, and therefore, this effect would be long-term and negative.	medium (Significant)	The loss of roost trees and individual trees identified as having high bat potential will be mitigated by the provision of bat boxes designed for trees, for example Schwegler 1FF and 2F boxes and by creating integrated bat habitat features within trees (**Mitigation Item E-27**). Three bat boxes will be provided as mitigation for each roost tree or high potential tree lost under the footprint of the proposed scheme. Bat boxes will be monitored post tree felling to determine uptake and success, the results of which will be reported to SNH and Transport Scotland. The locations of retained woodland habitat identified for erection of bat boxes and landscape and ecological planting are shown on Figure 9.5.	No significant residual impacts predicted.
Breeding birds	Regional	Increased and new road footprint.	Throughout the proposed scheme.	Direct mortality of individuals throughout the proposed scheme through road-traffic related incidents. This effect would be long-term and negative to the low number of individuals affected and is unlikely to affect the overall breeding bird assemblage.	low (Not significant)	No mitigation is required for this non-significant impact; however, planting proposed as mitigation for bats (**Mitigation Item E-26**) would further reduce this effect of this impact.	Impact was not significant prior to mitigation and therefore there is no residual impact.

Ecological Feature	Importance	Impact	Location of Impact	Effect	Pre-mitigation Impact Descriptor & Significance	Mitigation Item	Summary of Residual Impact and Significance (post-mitigation)
		Loss of habitat from the footprint of the proposed scheme.		Loss of suitable breeding habitat which could result in reduced breeding success. This effect would be long-term and negative as species can re-colonise an area.	Medium (Significant)	The loss of breeding bird habitat will be replaced through the landscape and ecological mitigation planting design (Figure 9.5). The landscape and ecological mitigation planting design has incorporated a variety of breeding bird habitats including planting of woodland, scrub, hedgerow and species rich grassland as shown on Figure 9.5 (**Mitigation Item E-28**).	During the growth phase of landscape and ecological planting, a significant negative residual impact is predicted due to loss and fragmentation of habitat. However, this impact would be temporary in nature and once cover is established no significant residual impacts are predicted.
Schedule 1 Birds (Barn owl, red kite and quail)	Construction impacts only.						
Otter	Regional	Loss of terrestrial habitat from the footprint of the proposed scheme.	For locations of otter activity see Appendix A11.3 (Confidential Ecology Features). Potential for pollution of watercourses at: • ch180 of Link 6; • ch150 of Link 2 • ch550 of Link 2 • ch50 of Link 3 • ch300 of Link 3 • ch540 of Link 3 • ch75 of Link 4 • ch850 of Link 4	Reduction in availability of foraging habitat. Fragmentation of connecting habitats leading to increase in barriers to movement and access to resources for the species within the catchment. This effect would be long-term and negative; however, the current baseline indicates that no holts or couches will be lost or disturbed and numbers of affected individuals likely to be a low proportion of overall population.	low (Significant)	Fragmentation of habitat will be reduced during operation by retention of commuting routes through creation of suitable crossing points including provision of culverts suitable for passage by otter, so movement between areas of habitat can be maintained. Post-construction monitoring to determine the effectiveness of the crossing structures will be undertaken (**Mitigation Item E-29**). Mammal fencing will be provided to prevent access on to the A9/A96 Inshes to Smithton carriageway and will be positioned to direct animals to safe crossing points along the proposed scheme. Fencing will follow SNH and DMRB guidance (SNH 2019b; SNH 2019c; Highways Agency, Scottish Government, Welsh Assembly Government and The Department of Regional Development Northern Ireland 1999). (**Mitigation Item E-30**). The loss of areas identified as suitable otter habitat will be replaced through mixed woodland or woodland riparian planting as shown on Figure 9.5 (**Mitigation Item E-31**). Although current baseline indicates that no holts or couches will be lost under the proposed scheme; the destruction of any holts or couches identified during pre-construction surveys will be conducted under licence following consultation with SNH (**Mitigation Item E-09**).	No significant residual impacts predicted.
		Pollution from road runoff.		Decreased water quality resulting in reduced condition of individuals and a reduction in prey resource. Predicted to be a long-term and negative effect, but proportion of population affected likely to be low and the species can readily use unaffected areas.	low (Significant)	Mitigated through compliance with **Mitigation Item E-22**. Road surface run-off will be subject to treatment via SuDS. See **Mitigation Item WO-04** for more details. Likely locations of SuDS features are indicated on Figure 9.5.	No significant residual impacts predicted.
Badger	Authority	Severance of habitat by the proposed scheme.	For locations of badger activity see Appendix A11.3 (Confidential Ecology Features). Potential severance of suitable badger habitat at: • ch180 of Link 6 • ch150 and 550 of Link 2 ch50, 300 and 540 of Link 3 • ch75 and 850 of Link 4	Habitat fragmentation/isolation which would restrict/preclude movement for the purposes of badger ecological function and genetic flow. This effect would be permanent and negative.	high (Significant)	Mitigated through compliance with **Mitigation Item E-30**. The landscape and ecological mitigation planting design (Figure 9.5) will be followed to encourage use of crossing points (**Mitigation Item E-32**). Possible crossing points and associated mammal fencing are shown on Figure 9.5.	No significant residual impacts are predicted. However, there may be a positive impact due to increased permeability of the proposed scheme through provision of crossing structures and mammal fencing.
		New road footprint.		Potential for direct mortality of badgers caused by collision with road traffic. Permanent negative effect on an individual level, but unlikely to occur in sufficient numbers to affect the wider population and would be long-term, reversible and negative.	medium (Significant)	Fragmentation of habitat will be reduced during operation by retention of commuting routes through creation of suitable crossing points including provision of culverts suitable for passage by badgers and one DMU so movement between areas of habitat can be maintained. Post-construction monitoring to determine the effectiveness of the crossing structures will be undertaken (**Mitigation Item E-29**). Locations of culverts and the DMU are shown on Figure 9.5.	No significant residual impacts are predicted.
		Loss of foraging habitat from the footprint of the proposed scheme.	Throughout the proposed scheme. For survey results see Appendix A11.3 (Confidential Ecology Features).	Reduction in availability or fragmentation of foraging habitat. This effect would be long-term, reversible and negative.	medium (Significant)	The loss of areas identified as suitable badger habitat will be replaced through the landscape and ecological mitigation planting design (Figure 9.5) (**Mitigation Item E-33**).	No significant residual impacts are predicted.
		Noise and vibration along the proposed scheme and light spill associated with the operation of the road and increased traffic.		Altered use of habitats and disturbance of badger habitat leading to a change in the distribution of local population(s) and a reduction in available resources. This effect would be long-term and neutral.	medium (Significant)	Lighting shall be designed to avoid illuminating badger sensitive habitat (**Mitigation Item LV-17, Mitigation Item LV-28, and Mitigation E-34**).	No significant residual impacts are predicted.

Ecological Feature	Importance	Impact	Location of Impact	Effect	Pre-mitigation Impact Descriptor & Significance	Mitigation Item	Summary of Residual Impact and Significance (post-mitigation)
Fish: Habitat availability, hydrology, water quality and key habitat quality	Regional	Altered habitat under structures such as culverts associated with the proposed scheme.	Cairnlaw Burn (SWF08): • ch75 of Link 4; and • ch850 of Link 4.	Permanent alteration of habitat resulting in altered use of habitat by fish. This would be a permanent, negative effect.	medium (Significant)	Mitigated through compliance with **Mitigation Item E-03** including the use of natural bed material within culverts as per best practice guidance.	No significant residual impacts are predicted.
	Regional	Culverts associated with the proposed scheme may alter flows and substrate conditions, which may fragment the watercourse.	Cairnlaw Burn (SWF08): • ch75 of Link 4; and • ch850 of Link 4.	Channel modifications resulting in changes in substrate movement and scouring of substrates at the culvert outlet. This would discourage or prevent the upstream migration of fish. This would be a permanent, negative effect.	high (Significant)	Channel modifications and structures to be designed in accordance with best practice guidance, to maintain full habitat connectivity by ensuring a suitable flow regime and substrate composition under the footprint of all culverts (**Mitigation Item E-03).**	No significant residual impacts are predicted.
	Regional	Increase in contaminant runoff from the proposed scheme.	Cairnlaw Burn (SWF08): • ch75 of Link 4; and • ch850 of Link 4.	Pollution leading to a decrease in water quality. Fine sediment inputs smothering important substrates. These impacts can alter the amount and quality of habitat for fish species. This would be a negative effect that could have long-term implications.	medium (Significant)	Mitigated through presence of SuDS (**Mitigation Item WO-04**) and application of best practice guidance (**Mitigation Item E-03**).	No significant residual impacts are predicted.
	Regional	Increase in sediment inputs from silt collected in road drainage.	Cairnlaw Burn (SWF08): • ch75 of Link 4; and • ch850 of Link 4.	Inputs of fine sediments resulting in smothering of substrates important for juveniles and spawning adults. This would be a negative, recurring, short-term effect.	medium (Significant)		No significant residual impacts are predicted.
Macroinvertebrates: Water quality, instream habitat availability and habitat quality.	Authority	Altered habitat under structures associated with the proposed scheme. Increase in contaminant and sediment runoff from the proposed scheme. Culverts create unnatural flow and substrate conditions that may fragment the burns.	Cairnlaw Burn (SWF08): • ch75 of Link 4; and • ch850 of Link 4. Scretan Burn (SWF04): • ch150 of Link 2; and, • ch300 of Link 3. Inshes Burn (SWF02): • 30m north of ch0 on A9	Pollution leading to decreased water quality. Input of fine sediments that can smother important substrates. These impacts can alter the amount and quality of habitat for macroinvertebrates. These effects will be recurring, but localised and short-term. Altered habitat use and habitat fragmentation for species with poor or no flying adult stages. This would be a permanent, negative effect.	low (Not significant)	Mitigated through compliance with **Mitigation Item E-03**.	No significant residual impacts are predicted.
	Authority	Increase in contaminant runoff from the road near watercourses	Cairnlaw Burn (SWF08): • ch75 of Link 4; and • ch850 of Link 4 Scretan Burn (SWF04): • ch150 of Link 2; and, • ch300 of Link 3. Inshes Burn (SWF02): • 30m north of ch0 on A9	Pollution leading to reduced water quality in the burns. This would be a long-term negative effect.	low (Not significant)	Mitigated through presence of SuDS (**Mitigation Item WO-04**) and application of best practice guidance (**Mitigation Item E-22**).	No significant residual impacts are predicted.
	Authority	Increase in sediment inputs from silt collected in road drainage at the above locations.	Cairnlaw Burn (SWF08): • ch75 of Link 4; and • ch850 of Link 4. Scretan Burn (SWF04): • ch150 of Link 2; and, • ch300 of Link 3. Inshes Burn (SWF02): • 30m north of ch0 on A9	Inputs of fine sediments resulting in smothering macroinvertebrate habitat. Sediment loading could smother the gills of some species. This would be a recurring, short-term, negative effect.	medium (Significant)		No significant residual impacts are predicted.
INNS	Construction impacts only						

11.7 Statement of Significance

11.7.1 A temporary significant negative residual impact is identified due to loss and fragmentation of woodland on bats and breeding birds; however, once landscape and ecological planting matures, no residual impacts are predicted. A non-significant minor negative residual impact is predicted for freshwater fish due to mortality of fish during dewatering and instream works activities where required during construction.

11.7.2 There would be no other residual impacts during the construction and operational phase of the proposed scheme that are considered to be significant in accordance with the EIA Regulations.

11.8 References

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