

12 Ecology and Nature Conservation

12.1 Introduction

- 12.1.1 This chapter presents the results of the Design Manual for Roads and Bridges (DMRB) Stage 2 Ecological Impact Assessment (EclA) for each of the route options. The assessment considers the potential impacts of the route options on terrestrial and freshwater species, habitats and ecosystems. It identifies the route option which is the most environmentally sensitive in terms of ecology and nature conservation.
- 12.1.2 The chapter is supported by the following appendices:
- Appendix A12.1 (Legislation and Policy Framework);
 - Appendix A12.2 (Species Names and Target Notes); and
 - Appendix CA12.1 (Confidential Appendix – Badger and Otter). This is not published with the EclA due to the potential risk to protected species from locational data being publicly available. However, these data will be submitted as a confidential report to Scottish Natural Heritage (SNH) and Transport Scotland.
- 12.1.3 The assessment is derived primarily from a desk based review of available information, augmented with an extended Phase 1 habitat survey, targeted field surveys and consultation responses received (as per Chapter 7: Overview of Environmental Assessment, Section 7.6). Ecological features were assessed up to 500m from the route options.

12.2 Approach and Methods

Scope and Guidance

- 12.2.1 The approach to this assessment is based on the guidance provided in:
- DMRB Volume 11, Section 2, Part 5: HA205/08 Assessment and Management of Environmental Effects (Highways Agency et al. 2008) (hereafter referred to as 'HA205/08');
 - DMRB Volume 11, Section 3, Part 4: Ecology and Nature Conservation (Highways Agency et al. 1993); and
 - DMRB Interim Advice Note 130/10 'Ecology and Nature Conservation: Criteria for Impact Assessment' (Highways Agency et al. 2010) (hereafter referred to as IAN130/10).
- 12.2.2 In addition to DMRB guidance, other policy documents and published guidance taken into account in the preparation of this chapter include:
- Scottish Transport Appraisal Guidance (STAG) (Transport Scotland, 2014);
 - the Chartered Institute for Ecology and Environmental Management's (CIEEM) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd edition (CIEEM 2016);
 - Scottish Government's Planning for Natural Heritage: Planning Advice Note 60 (Scottish Executive 2000);
 - Scottish Government's Planning Advice Note 1/2013: Environmental Impact Assessment (Scottish Government 2013a);
 - Scottish Natural Heritage's (SNH), a handbook on environmental impact assessment (SNH 2013); and
 - Scottish Fisheries Co-Ordination Centre (SFCC) Habitat Surveys manual (SFCC 2007).

Study Area

12.2.3 The study area extends to 500m from all of the route options and is shown on Figures 12.1 to 12.3.

Baseline Conditions

Desk Based Assessment

12.2.4 A desk study was undertaken to review existing relevant literature and web-based resources, and to obtain ecological information within the study area. This included a review of data collected to inform the A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 3 Environmental Statement (Jacobs 2016). Other resources utilised included:

- A96 Inverness to Nairn (including Nairn Bypass): DMRB Stage 2 Scheme Assessment Report (Jacobs 2014);
- Stratton Environmental Statement. Planning Application for urban expansion including a new town centre (WSP Energy and Environment 2009);
- Scottish Environment Protection Agency (SEPA) Water Framework Directive (WFD) classifications (SEPA 2017); and
- survey data from Scottish Badgers.

12.2.5 Information for the desk study was also obtained from the following online resources:

- Joint Nature Conservation Committee (JNCC) website (JNCC 2016); and
- SNH Information Service (SNH 2016a).

Site Surveys

12.2.6 An extended Phase 1 habitat survey (JNCC 2010) of the study area was undertaken by Jacobs ecologists in April 2016 to supplement survey data obtained from the A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 2 Scheme Assessment Report, (Jacobs 2014) and the A96 Dualling Inverness to Nairn (including Nairn Bypass) Environmental Statement (Jacobs 2016).

12.2.7 Information from the National Biodiversity Network (NBN) gateway website (NBN 2016) was also used to inform the scope and extent of species surveys.

12.2.8 Targeted ecology surveys were conducted by Jacobs between March 2016 and April 2016 comprising:

- bat habitat assessment surveys undertaken within 50m of the route options to identify the roosting potential of suitable buildings, structures (such as bridges) and trees, which were categorised according to the Bat Conservation Trust (BCT) Good Practice Guidelines (Collins 2016);
- otter and water vole surveys undertaken along watercourses within the study area (except Inshes Burn (SWF 02), upstream of NH 69249 45698). Surveys followed the current best practice guidance of Chanin (2003) and Strachan et al. (2011), respectively; and
- aquatic walkover surveys undertaken on watercourses potentially directly impacted by one or more of the route options. Watercourses were surveyed within a 100m buffer to either side of the centreline of the route option footprint to characterise presence, absence and distribution of supporting habitat for aquatic species of conservation interest. Watercourses were classified as being of high, medium or low ecological value, using the criteria in Table 12.1 along with professional judgement. No targeted surveys for fish species were undertaken at this stage.

Table 12.1: Example of high, medium and low watercourse ecological habitat value criteria

Ecological Value	Criteria
High	Permanent watercourse with variable flow types and heterogeneous habitat. In-stream and bankside cover for fish. No signs of pollution (e.g. sewage sludge, excess algae growth, ochre coloured water/sediment). High potential to support species of conservation interest. No obvious habitat modifications. No barriers to migration.
Medium	Two or more flow types. Heterogeneous habitat. Some in-stream and/or bankside fish cover noted. Potential to support species of conservation interest. Some habitat modifications. Barriers to migration may be present.
Low	Reach dominated by a single flow type. Homogenous habitat. No in-stream or bankside cover. Pollution may be present. Low potential to support species of conservation interest. Heavily modified. Barriers to migration are likely to be present.

Impact Assessment

12.2.9 In accordance with CIEEM (2016), the impact assessment focused on important ecological features. Importance of ecological features in the study area, and the nature of potential impacts on these features (including duration, extent and reversibility), are defined using criteria as set out below.

Importance

12.2.10 The general approach to defining the importance of ecological features followed CIEEM guidelines (CIEEM 2016) and IAN130/10. Ecosystems, habitats and species were assigned levels of importance for nature conservation based on the criteria set out in Table 12.2. The list of examples provided in Table 12.2 is not exhaustive.

12.2.11 Factors taken into account when determining the importance of an ecological feature included:

- rarity and uniqueness;
- ability to resist or recover from environmental change;
- function/role within an ecosystem; and
- level of legal protection or designation.

Table 12.2: Importance Criteria for Ecological Features

Importance	Criteria	Example of Ecological Feature
International	<p>Ecosystems and Habitats Ecosystems or habitats essential for the maintenance of:</p> <ul style="list-style-type: none"> • internationally designated areas or undesignated areas that meet the criteria for designation; and/or • viable populations of species of international conservation concern. <p>Species Species whose presence contributes to:</p> <ul style="list-style-type: none"> • 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. 	<p>Ecosystems and Habitats</p> <ul style="list-style-type: none"> • internationally designated areas; or, • smaller watercourses that are undesignated but which are connected to, or have functionally important habitat for, internationally designated areas. <p>Species</p> <ul style="list-style-type: none"> • a host species for another viable and internationally important population of a species of international conservation concern; or • any regularly occurring population of an internationally important species, which is threatened or rare in the UK (such as a UK Red List species).
National	<p>Ecosystems and Habitats Ecosystems or habitats essential for the maintenance of:</p> <ul style="list-style-type: none"> • qualifying communities and assemblages that occur within nationally designated sites or within undesignated areas that meet the criteria for such designation; and/or 	<p>Ecosystems and Habitats</p> <ul style="list-style-type: none"> • nationally designated site, e.g. a Site of Special Scientific Interest (SSSI); • areas of land or water that are important in maintaining the viability of a nationally important population or key habitat in the wider area; • a viable area of a priority habitat identified as

Importance	Criteria	Example of Ecological Feature
	<ul style="list-style-type: none"> viable populations of species of national conservation concern. <p>Species</p> <p>Species whose presence contributes to:</p> <ul style="list-style-type: none"> 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 the maintenance and restoration of biodiversity and ecosystems at a national level, as defined in the Scottish Biodiversity Strategy (SBS) (Scottish Government 2013b, 2015). 	<p>requiring conservation action in the Scottish Biodiversity List (SBL); or,</p> <ul style="list-style-type: none"> an area of ancient woodland. <p>Species</p> <ul style="list-style-type: none"> a regularly occurring population/number of a nationally important species; or any species that is a qualifying feature of a nationally designated site.
Regional	<p>Ecosystems and Habitats</p> <p>Ecosystems or habitats essential for the maintenance of:</p> <ul style="list-style-type: none"> 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; key habitat systems listed in the Highland BAP, and/or viable populations of species of regional conservation concern. <p>Species</p> <p>Species whose presence contributes to:</p> <ul style="list-style-type: none"> the maintenance and restoration of biodiversity and ecosystems at a regional level, as defined in the Highland BAP. 	<p>Ecosystems and Habitats</p> <ul style="list-style-type: none"> areas that support key habitats as highlighted within the Highland BAP, whether designated or undesignated; or, any river classified as Good Status or above under the WFD and capable of supporting salmonid populations. <p>Species</p> <ul style="list-style-type: none"> any regularly occurring population of a species listed in a regional BAP; or any species listed in the Moray Firth SNH Natural Heritage Futures area as a characteristic terrestrial species (SNH 2002, 2009).
Authority Area	<p>Ecosystems and Habitats</p> <p>Ecosystems or habitats essential for the maintenance of:</p> <ul style="list-style-type: none"> populations of species of conservation concern within the authority area. <p>Species</p> <p>Species whose presence contributes to:</p> <ul style="list-style-type: none"> the maintenance and restoration of biodiversity and ecosystems at authority area level, as defined in the Inverness and Nairn BAP (Inverness and Nairn Biodiversity Group 2004). 	<p>Ecosystems and Habitats</p> <ul style="list-style-type: none"> individual semi-natural woodland sites that are not linked to a wider network of ancient woodland sites. <p>Species</p> <ul style="list-style-type: none"> any regularly occurring, locally significant population of a species that is listed in the Inverness and Nairn BAP.

12.2.12 The evaluation of watercourses was made based on the ecological value assigned to surveyed reaches (Figures 12.10 to 12.12 and Section 12.4). Evaluations were applied to entire watercourses with the exception of Cairnlaw Burn (SWF 08) which was given two different evaluations because physical and habitat conditions in the watercourse changed substantially within the study area.

Impact Magnitude

12.2.13 Upon determining the importance of an ecological feature, the potential impacts of the route options on these features were identified by utilising consultation responses (as per Chapter 7: Overview of Environmental Assessment, Section 7.6), previous project experience (including knowledge and assessment of construction methods and operational activities), and professional judgement.

12.2.14 For the purposes of this assessment, the term 'impact magnitude' is taken to represent the overall characterisation of positive or negative impacts in accordance with (HA205/08) and CIEEM guidance (CIEEM 2016), 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).

12.2.15 The magnitude (and character) of impacts is defined using the criteria set out in Table 12.3. Impact magnitude was identified as high, medium, low or negligible, taking into account the above impact characterisation approach.

Table 12.3: Impact Magnitude and Characterisation for Ecological Features

Impact Characterisation	Impact Magnitude
<p>A permanent effect on the distribution and/or abundance of a habitat, species assemblage/community or population. A permanent effect is one which results in changes to the distribution of habitats over more than one season, one which changes the availability of critical habitats for a species over multiple generations, changes to the fecundity of a species, or one which has the potential to affect an entire cohort of juveniles of a species.</p> <p>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.</p>	High
<p>A long-term but reversible effect on the distribution and/or abundance of a habitat, species assemblage/community or population, such as an effect that changes the distribution of habitats that are replaceable within the lifetime of the proposed Scheme, in either form or ecosystem function, but not within a single season or life cycle of any species that depends on such habitats. This also applies to changes in the distribution of a species which allow it to re-colonise a habitat, but not within a single season or life cycle. 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.</p>	Medium
<p>A short-term reversible effect on the distribution and/or abundance of a habitat, species assemblage/community or population, and one which is within normal fluctuations observed in the ecology of the feature.</p>	Low
<p>A short-term reversible effect on the distribution and/or abundance of a habitat, species assemblage/community or population, unlikely to be detectable by monitoring.</p>	Negligible

Impact Significance

- 12.2.16 In general accordance with CIEEM (2016) a significant impact is an impact (negative or positive) on the integrity of a defined site or ecosystem and/or on the conservation status of habitats and species. Significance of impact is also determined by taking cognisance of the relevant guidance in IAN130/10 and SNH (2013a).
- 12.2.17 Integrity is the coherence of ecological structure and function (across the whole area of a site) that enables it to sustain a habitat, complex of habitats and/or the levels of populations of species. 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 as well as the long-term distribution and abundance of its population within a given geographical area. Conservation status for species is determined by the sum of influences acting on the species concerned that may affect the long-term distribution and abundance of its population within a given geographical area.
- 12.2.18 In accordance with (HA205/08) the above magnitude and importance information is taken together and applied to a matrix to categorise the significance of an impact (refer to Table 12.4). Professional judgement is, however, relied upon to ensure that an impact is categorised appropriately. The impact significance terms are explained in Table 12.5.

Table 12.4: Impact Significance

Magnitude Importance	High	Medium	Low
International	Major	Major	Moderate
National	Major	Moderate	Moderate
Regional	Major	Moderate	Minor
Authority Area	Moderate	Minor	Negligible

Table 12.5: Description of Significance Categories

Significance Category	Typical Description
Major	Associated with features of international, national or regional importance. Likely to be a damaging impact or loss of integrity. Effects likely to be permanent and irreversible, resulting in a loss of structure and/or function. If beneficial, they will have a significant positive effect on the international or national feature.
Moderate	Associated with features of international, national, regional or authority area importance. Likely to be a damaging impact or loss of integrity. Effects are likely to be long term but reversible. If beneficial, they will have a significant positive effect on the international or national feature.
Minor	Associated with features of regional, or authority areal importance. Likely to be a damaging impact or loss of integrity. Effects are likely to be short term and reversible.
Negligible	No detectable effects. Effects may also be within the normal bounds of variation for a feature.

- 12.2.19 Only impacts on important ecological features (authority area importance or above) were progressed through the detailed assessment process. For example, an area of amenity grassland, or non-designated woodland would be evaluated as of less than authority area ecological importance, and therefore would not progress through the assessment. However, any impact on a SSSI would progress through the assessment as such sites are designated as nationally important. Detailed mitigation would, however, also be required to be developed pre-construction to ensure that any potential breaches of legislation are avoided, regardless of a feature's importance or significance of impact (e.g., damage to an active bird nests).
- 12.2.20 Where impacts were assessed as being of Major or Moderate significance, these were considered to be potentially significant under the terms of the EIA Regulations (further information can be found in Chapter 7: Overview of Environmental Assessment), and would require further assessment and development of mitigation at DMRB Stage 3 to reduce impacts where feasible.

Limitations

- 12.2.21 Due to design changes and land access constraints, surveys were not undertaken at some locations within the identified survey area. Aerial photography was used to facilitate the classification of habitats not accessed. Where necessary, the precautionary principle was applied to enable assessment of habitat suitability for ecological features and evaluate the impacts on these features. Full surveys for all receptors will be undertaken at DMRB Stage 3.

12.3 Policies and Plans

- 12.3.1 Appendix A8.1 (Planning Policy Context for Environmental Assessment) describes the planning policies and guidance from national to local level which are relevant to ecology and nature conservation. An assessment of the compliance of the route options against all development plan policies relevant to this environmental topic is reported in Appendix A8.2 (Assessment of Development Plan Policy Compliance) and a summary overview is provided in Chapter 8 (Policies and Plans), Section 8.4 (Compliance with Policies and Plans).

12.3.2 The legislative background is a combination of international conventions and directives and national legislation. Full details can be found in Appendix A12.1 (Legislation and Policy Framework), however the principal legislative tools include:

- Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland);
- Water Framework Directive (European Council Directive 2000/60/EC);
- Wildlife and Countryside Act 1981 (as amended) (WCA) (including updates in Scotland);
- Nature Conservation (Scotland) Act 2004;
- Wildlife and Nature Conservation (Scotland) Act 2011 (WANE);
- Protection of Badgers Act 1992 (as amended by WANE); and
- Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003.

Biodiversity Action Plan

12.3.3 The study area is covered by the regional Highland BAP (Highland Environment Forum, 2016) and is further covered by the Local BAP for Inverness and Nairn (Inverness and Nairn Biodiversity Group, 2004) (Appendix A12.1: Legislation and Policy Framework).

12.4 Baseline Conditions and Evaluation

12.4.1 This section summarises the existing ecological conditions within the study area that have been determined through desk study, consultation and site surveys. The baseline information is shown in Table 12.6 and presented on Figures 12.1 to 12.12, in Confidential Appendix CA12.1 (Badger and Otter), and in supporting Confidential Figures C12.1 to 12.6.

12.4.2 All references to watercourses are provided in the same context as within Chapter 14 (Road Drainage and the Water Environment), providing their Surface Water Feature (SWF) reference.

Designated Sites

12.4.3 Three statutory designated sites lie within the study area (Table 12.6, Figure 12.1 to 12.3):

- Longman and Castle Stuart Bays Site of Special Scientific Interest (SSSI) (SNH 2008a);
- Inner Moray Firth Special Protection Area (SPA) (JNCC, 2015a, 2016); and
- Inner Moray Firth Wetland of International Importance (Ramsar) (JNCC 2016).

12.4.4 The Moray Firth Special Area of Conservation (SAC) lies approximately 900m from the route options but is hydrologically connected to it via Scretan (SWF 04) and Cairnlaw burns (SWF 08).

12.4.5 One non-statutory designated site is present within the study area, the Moray Basin, Firths and Bays International Bird Area (IBA) (Table 12.6, Figure 12.1 to 12.3) (BirdLife International 2016). IBAs are sites identified using internationally agreed criteria applied locally by Birdlife Partners, in the UK this is the Royal Society for the Protection of Birds (RSPB). These criteria take into account the status of bird species and knowledge of the size and trends of bird populations. The Moray Basin, Firths 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/Ramsar (which are designated wholly or partly for their bird assemblages) and the Moray Firth SAC, and therefore it has not been taken forward to the impact assessment stage; potential impacts and mitigation identified for the statutory designated sites would satisfy any requirements for the IBA.

12.4.6 Two Ancient Woodland Inventory (AWI) sites (SNH, undated, 2008b) are present within the study area as well as 16 sites categorised under the Native Woodland Survey Scotland (NWSS) (Patterson

et al., 2014). A description of these is provided in Table 12.6 and their locations are shown on Figures 12.1 to 12.3

Table 12.6: Summary of Ecological Features Recorded in the Study Area

Feature	Data Source	Baseline	Legal/BAP Status	Justification	Importance
Statutory Designated Sites					
Moray Firth SAC UK0019808 NH 976 821 15,1273ha	JNCC, 2016 SNH, 2016d	The Moray Firth in north-east Scotland supports the only known resident population of bottlenose dolphin in the North Sea. The population is estimated to be around 130 individuals (Wilson et al., 1999). Dolphins are present all year round, and, while they range widely in the Moray Firth, they appear to favour particular areas.	European/Ramsar site under Conservation (Natural habitats &c) Regulations 1994 (as amended in Scotland).	Designated for its subtidal sandbanks and population of bottlenose dolphin.	International
Inner Moray Firth SPA, UK9001624 and Ramsar site, UK13025 NH 672 528, 580 480, 800 590, 705 473, 730 500 2,339ha	JNCC, 2015a,2016 SNH, 2016b	This site comprises the Beaully Firth and Inverness Firth. It contains extensive intertidal flats and smaller areas of saltmarsh. The rich invertebrate fauna of the intertidal flats, with beds of eelgrass, glasswort, and <i>Enteromorpha</i> algae, provide important food sources for large numbers of wintering and migrating waterbirds (geese, ducks and waders). The boundary of the SPA and Ramsar follows those of the Beaully Firth SSSI, Munloch Bay SSSI, Longman and Castle Stuart Bays SSSI and Whiteness Head SSSI.		Designated for their breeding and non-breeding bird interest, and littoral and supralittoral habitats. In addition to this the Ramsar designation covers saltmarsh, sand dune and shingle habitats.	International
Longman and Castle Stuart Bays SSSI site code 1675 NH 715 496 424ha	SNH, 2008a SNH, 2016c	This site includes extensive areas of intertidal mudflats which provide rich feeding grounds for wintering wildfowl and waders and an important roosting area for these birds. There are approximately 6ha of ungrazed saltmarsh in a sheltered bay 2km east of Alturlie Point, and there are substantial areas of pioneer plant species typical of northern firths, such as the nationally scarce dwarf eelgrass and narrow-leaved eelgrass.	Designated under the Nature Conservation (Scotland) Act 2004.	Designated for mudflats, saltmarshes, eelgrass beds and wintering waterfowl and waders.	National
Habitats and Plant Species					
AWI woodland (2 sites) Category 2b LEPO	SNH, undated; 2008b	Two AWI woodland sites within the study area, to the south at Balvonie woodland. These are category 2b "Long-established of plantation origin" (LEPO).	AWI is regarded as an important and irreplaceable national resource. Actions for ancient woodland have also been identified in the Highland BAP to protect relict areas.	SBL priority habitat (including a variety of semi-natural broadleaved woodland types). The Scottish Government's policy on control of woodland removal states that there is a strong presumption against removing ancient semi-natural woodland or plantations on ancient woodland sites.	National
NWSS woodland	Patterson et al., 2014	Thirteen of the NWSS woodland sites within the study area are categorised as Native woodland. These comprise upland birchwood, oakwood and mixed ash woodland as well as lowland mixed deciduous woodland. Two areas were classified as nearly native woodland and one as open land habitat.	Upland oakwood, upland birchwood, upland mixed ashwoods and lowland mixed deciduous woodland are all listed in the SBL.	Broadleaved semi-natural woodland with a broad range of tree species and well established, diverse ground flora.	Authority Area
Non designated woodland	Phase 1 Habitat Survey (Figures 12.4 to 12.6)	Site Survey: Three areas of woodland within the study area are not covered by any designations. These comprise broad-leaved semi-natural woodland and broad-leaved plantation containing a variety of species with the common dominant species consisting of oak, beech, and birch.	None.	These woodland are not listed on either the AWI or the NWSS and have a reduced diversity in comparison with other woodland areas.	Less than Authority Area
Agricultural land	Phase 1 Habitat Survey (Figures 12.4 to 12.6)	Site Survey: The majority of the study area was under agricultural management comprising arable fields, improved grassland and poor semi-improved grassland. Grassland was predominantly grazing for sheep and cattle.	None.	Arable farmland is an extensive habitat found across the country. Under normal extensive management, it has limited ecological interest. Improved grassland is one of the most intensively managed habitats; it is widespread throughout the Scottish Lowlands and is botanically species-poor with limited ecological interest. Poor semi-improved grassland is less intensively managed than improved grassland, however it is species-poor and generally not differentiable into acid/calcareous.	Less than Authority Area
Terrestrial Species					
Otter	Jacobs, 2016	Present within the study area. Refer to Confidential Appendix CA12.2 for the desk based records and site surveys records for otter.	European Protected Species (EPS) under the Conservation (Natural habitats &c) Regulations 1994 (as amended in Scotland). Listed in the Highland BAP and Inverness and Nairn BAP.	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, et al., 2015; SNH, 2015). SNH have indicated that otter populations in the East Highland area, which includes the Moray Firth and River Nairn, may be at or near carrying capacity (Strachan 2007). Otter have been recorded at three distinct locations within the study area.	Regional
Bats	WPS Energy and Environment, 2009	Desk Based: Both common and soprano pipistrelle have been recorded at the north of the study area around the locality of Stratton Farm in 2008. Four non-breeding roost sites have been identified (locations unknown). Leisler's bat was recorded near Nairn in 2010 however it has not been recorded since. No evidence of Leisler's has been obtained within the study area. Site Survey: Taking into account roosting, commuting and foraging potential 11 habitat areas within the study area were assessed to be of overall high potential for bats and six as moderate potential (Figures 12.7 to 12.9).	All UK bat species are EPS under the Conservation (Natural habitats &c) Regulations 1994 (as amended in Scotland). There are ten 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	Common and soprano pipistrelle are widespread and found throughout the majority of Scotland (Bat Conservation Trust 2010a, 2010b). The site provides high and moderate potential foraging and commuting habitat - woodland and watercourses. Roosting potential ranges from high to negligible with an unknown number of roosts nearby.	Regional

Feature	Data Source	Baseline	Legal/BAP Status	Justification	Importance
			are listed on the Inverness and Nairn BAP.		
Badger	Jacobs, 2016	Present within the study area. Refer to Confidential Appendix CA12.1 for the desk based records and site surveys records for badger.	Protection of Badgers Act 1992 (as amended). Listed in the Inverness and Nairn BAP.	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).	Regional
Water vole	Jacobs, 2016	Desk Based: Jacobs recorded water vole on a tributary of Scretan Burn (SWF 04) (Inshes Burn (SWF 02)) in 2015 within the Inverness Retail and Business Park (Figures 12.7 to 12.9). Site Survey: No further evidence of water vole was recorded within the study area during the site surveys. However suitable habitat exists along Inshes Burn (SWF 02) and SWF 09.	Schedule 5 of the WCA. Listed on the SBL. Listed in the Highland BAP and Inverness and Nairn BAP.	Water voles have undergone population declines in recent years (Jefferies 2003) and are now one of the UK's most endangered mammals.	Regional
Red squirrel	Jacobs, 2011	Desk Based: Red squirrel presence was confirmed to the south of the study area in Balvonie wood (NH 69806 42862) in 2010. Site Survey: No evidence of red squirrel was recorded within the study area during the site surveys.	Schedule 5 of the WCA. Listed on the SBL as a species for which conservation action is needed. Listed in the Highland BAP and Inverness and Nairn BAP.	No evidence of red squirrel was recorded within the study area. This species is widespread within Scotland although there has been widespread decline in population and range.	Less than Authority Area
Pine marten	Jacobs, 2016	Desk Based: A pine marten wildlife vehicle incident (WVI) was recorded near Scretan Burn (SWF 04) (NH 69821 45995). Site Survey: No evidence of pine marten was recorded within the study area during the site surveys.	Schedule 5 of the WCA. Listed on the SBL. Listed in the Highland BAP and Inverness and Nairn BAP.	No evidence of pine marten was recorded within the study area. This species is widespread throughout Scotland and well established in the Highlands (Croose et al., 2014).	Less than Authority Area
Aquatic Habitat and Species					
Aquatic Habitat Cairnlaw Burn (SWF 08) downstream of NH 70240 45941	Jacobs, 2016 SEPA, 2017	Desk Based: Jacobs (2016) surveys indicated that the habitat in Cairnlaw Burn (SWF 08) was of high ecological value along a reach partially within the study area. Site Survey: This reach of Cairnlaw Burn (SWF 08) was assessed as being of medium ecological value and contained some supporting habitat for aquatic species (Figures 12.10 to 12.12). This reach contained heterogeneous habitat for aquatic species and some natural features (e.g. meanders).	SEPA 2015 WFD Overall and Hydromorphology classification of Moderate.	Good habitat conditions for aquatic species, including lamprey, were observed in this reach of Cairnlaw Burn (SWF 08-1).	Regional
Aquatic Habitat Cairnlaw Burn (SWF 08) upstream of NH 70240 45941	Jacobs, 2016 SEPA, 2017	Cairnlaw Burn (SWF 08) upstream of this point is characteristic of a ditch and two reaches in this area of the burn were assessed as being of low ecological value (Figure 12.10 to 12.12). This area of Cairnlaw Burn was physically modified and characterised by low flow and little or no habitat heterogeneity.	SEPA 2015 WFD Overall and Hydromorphology classification of Moderate.	Cairnlaw Burn (SWF 08) upstream of this point is not expected to support healthy populations of designated aquatic species due to unsuitable habitat conditions.	Less than Authority Area
Aquatic Habitat Scretan Burn (SWF 04)	Jacobs, 2016	Desk Based: Jacobs (2016) surveys indicated that the habitat in Scretan Burn (SWF 04) downstream of the study area was of medium ecological value. One barrier to migration was noted in the burn near the sea. Site Survey: Scretan Burn (SWF 04) was assessed as being of medium ecological value and contained supporting habitat for aquatic species (Figures 12.10 to 12.12).	n/a	Although good habitat for aquatic species was observed, barriers will prevent migration of fish species of conservation interest.	Less than Authority Area
Aquatic Habitat Inshes Burn (SWF 02), Tributaries of Scretan and Cairnlaw burns, (SWF 03, SWF 06, SWF 07)	n/a	These watercourses were ditches and of low ecological value (Figures 12.10 to 12.12). The reaches were characterised by low/no flow and little or no habitat heterogeneity.	n/a	These burns are not expected to support healthy populations of designated aquatic species due to unsuitable habitat conditions.	Less than Authority Area
Fish Cairnlaw Burn (SWF 08) downstream of NH 70240 45941	Jacobs, 2016 SEPA, 2017	Desk Based: Jacobs (2016) surveys conducted in August 2015 on Cairnlaw Burn (SWF 08) indicated that European eel and trout were present within the 500m study area, but downstream of the reach surveyed in April 2016. An area with suitable juvenile lamprey habitat within the study area was also surveyed by Jacobs in August 2015, but no lamprey were found during subsequent fish surveys. Site Survey: No fish were observed during aquatic walkover surveys. Supporting habitat for lamprey species was noted in this area of Cairnlaw Burn (SWF 08).	SEPA 2015 WFD Fish classification of High.	This reach of Cairnlaw Burn (SWF 08-1) had suitable habitat for juvenile lamprey species. European eel, a critically endangered species, were found in Cairnlaw Burn (SWF 08) 400m downstream of this point in August 2015.	Regional
Fish Cairnlaw Burn (SWF 08) upstream of NH 70240 45941	SEPA, 2017	Site Survey: No fish were observed during aquatic walkover surveys. One fish (species unknown) was observed during otter surveys on Cairnlaw Burn (SWF 08) close to, but not within one of the aquatics survey reaches (SWF 08-3). No supporting habitat for fish species was noted within this area of Cairnlaw Burn (SWF 08).	SEPA 2015 WFD Fish classification of High.	This section of Cairnlaw Burn (SWF 08-2 and SWF 08-3) is not expected to support healthy populations of designated fish species due to unsuitable habitat conditions.	Less than Authority Area
Fish Inshes Burn (SWF 02), Tributaries of Scretan and Cairnlaw burns (SWF 03, SWF 06, SWF 07)	n/a	Site Survey: No fish were observed during aquatic walkover surveys and no supporting habitat for fish species was noted in these burns.	n/a		
Fish Scretan Burn (SWF 04)	n/a	Site Survey: No fish were observed during aquatic walkover surveys. Supporting habitat for European eel was noted in survey reach SWF 04-1 on Scretan Burn (SWF 04) and supporting habitat for lamprey species and trout was noted at both reaches on Scretan Burn (SWF 04).	n/a		
Macroinvertebrates Inshes Burn (SWF 02), Scretan Burn (SWF 04), Cairnlaw Burn (SWF 08),	SEPA, 2017	Site Survey: Supporting habitat for macroinvertebrates was noted during aquatic walkover surveys in Cairnlaw Burn (SWF 08) downstream of NH 70175 45590, Inshes Burn (SWF 02) and Scretan Burn (SWF 04). No supporting habitat for macroinvertebrates was noted in the	SEPA 2015 WFD Macroinvertebrate (WHPT) classification of Good for Cairnlaw Burn (SWF 08).	Although suitable habitat conditions for macroinvertebrates were observed in some watercourses, these burns are not expected to support healthy populations of	Less than Authority Area

Feature	Data Source	Baseline	Legal/BAP Status	Justification	Importance
Tributaries of Scretan and Cairnlaw burns (SWF 03, SWF 06, SWF 07).		other watercourses.		macroinvertebrate species of conservation interest.	
Macrophytes Inshes Burn (SWF 02), Scretan Burn (SWF 04), Cairnlaw Burn (SWF 08), Tributaries of Scretan and Cairnlaw burns (SWF 03, SWF 06, SWF 07).	SEPA, 2017	Site Survey: No supporting habitat for macrophytes was noted during aquatic walkover surveys.	SEPA 2015 WFD Macrophyte classification of High for Cairnlaw Burn (SWF 08).	These burns are not expected to support healthy populations of macrophyte species of conservation interest due to unsuitable habitat conditions.	Less than Authority Area

12.4.7 The approach at DMRB Stage 2 has been to present data that is considered most relevant to the route option assessment process and thus a number of ecological features are not considered here as follows:

- Scottish wildcat, internationally important, in decline and protected under the Conservation (Natural Habitats &c.) Regulations 1994 (as amended in Scotland), but no data to indicate definite presence in the study area;
- reptiles, protected under the WCA. There is little suitable habitat identified within the study area and assessments undertaken to inform the A96 Dualling Inverness to Nairn (including Nairn Bypass) Environmental Statement (Jacobs 2016) did not indicate their presence in the study area; and
- freshwater pearl mussel (FWPM), internationally important and noted in the Inverness and Nairn Biodiversity Action Plan (Inverness and Nairn Biodiversity Group 2004). No suitable habitat was observed during the site walkover surveys.

Plants of Conservation Interest

12.4.8 No plants classified as rare or scarce were recorded during the site survey. Bluebell, identified as a local priority species in the Inverness and Nairn LBAP (Inverness and Nairn Biodiversity Group 2004), was recorded in one location within the study area (See Appendix A12.2 Species Names and Target Notes, Target note 3).

Birds

12.4.9 Wintering bird surveys were undertaken to inform the A96 Dualling Inverness to Nairn (including Nairn Bypass) Environmental Statement (Jacobs 2016). The A96 Dualling Inverness to Nairn (including Nairn Bypass) Wintering Bird Report (Jacobs 2015) did not detect any evidence of use of the study area by qualifying species of the Inner Moray Firth SPA and Ramsar site.

12.4.10 The following incidental records were made during the walkovers:

- skylark observed in the area around Cairnlaw Burn (SWF 08) (NH 70062 45845);
- rookery recorded NH 69537 43928; and
- tawny owl roost recorded at NH 69694 45237.

Invasive Non-Native Species (INNS)

12.4.11 Two invasive non-native plant species and one animal species were recorded within the study area (Appendix A12.2 Species Names and Target Notes):

- Himalayan balsam (Target notes 6, 7, 11, 14 and 15);
- few-flowered leek (Target notes 5 and 9); and
- American mink (a significant predator of water vole; SNH 2016e) was recorded on Scretan Burn (SWF 04) (Jacobs 2016).

12.4.12 Invasive non-native species (INNS), whilst presenting a threat to biodiversity (Secretariat of the Convention on Biological Diversity 2001), are not factors in determining the preferred option at this stage, and will be considered when further detail is available on the land requirements at DMRB Stage 3 (i.e. once the route is known and land requirements includes areas that may be temporarily utilised/disturbed during construction).

12.5 Impact Assessment

- 12.5.1 Potential impacts on ecological features for all route options are described below in Table 12.7.
- 12.5.2 Where a potential impact was assessed as not significant (Minor or Negligible) according to the criteria summarised in Table 12.5, it was not considered further in the comparative assessment of the route options (paragraph 12.2.20). Standard construction and design practices would mitigate for these impacts.
- 12.5.3 Impacts on features of less than authority area importance are not considered within this impact assessment, as explained in paragraph 12.2.19.
- 12.5.4 Where an impact is initiated in construction but also occurs throughout operation (e.g. permanent habitat removal), it is discussed only within operational impacts.
- 12.5.5 Potential impacts in terms of the land that may be directly required for the route options (i.e. the scheme 'footprint') does not take into account any potential temporary land requirements during construction, as these are not known at this stage.
- 12.5.6 No impacts are predicted for the following features either during the construction or operational phases of the proposed Scheme as no effects pathways were identified.
- Moray Firth SAC; and
 - ancient woodland.
- 12.5.7 Water vole surveys were not conducted on the upper part of the Inshes Burn (SWF 02) during the DMRB Stage 2 assessments. However, as water vole presence was recorded by Jacobs downstream of the survey area (Jacobs 2016), the precautionary principle has been applied and they are presumed present.
- 12.5.8 Standard construction impacts may include:
- injury or mortality of protected species due to vegetation removal, vehicle movements or becoming trapped in uncovered holes and pipes;
 - temporary habitat fragmentation due to disturbance and instream activities;
 - disturbance to protected species from noise, lighting and movement of vehicles and increased human activity;
 - sediment release and run-off from construction works;
 - generation of dust from use of haul routes, earth movement and soil storage; and
 - temporary hydrological changes to terrestrial and aquatic habitats.
- 12.5.9 Standard operational impacts may include:
- injury and mortality of protected species from vehicle collisions;
 - permanent loss of habitats under footprint of the proposed Scheme;
 - fragmentation and severance of habitats;
 - disturbance to protected species from traffic noise and lighting;
 - pollution from road run-off; and
 - hydrological changes from run-off and structures.

Table 12.7: Description of Potential Impacts (Without Mitigation) for All Route Options.

Feature	Importance	Potential Impact	Potential Effect	Magnitude	Significance
Construction					
Inner Moray Firth SPA, UK9001624 and Ramsar site, UK13025 NH 672 528, 580 480, 800 590, 705 473, 730 500 2,339ha	International	Run-off from construction works including sediment release and chemicals from accidental spillage in the following locations: <ul style="list-style-type: none"> Cairnlaw Burn (SWF 08) ch1020/ch1140; Inshes Burn (SWF 02) ch200; and Scretan Burn (SWF 04) ch270/ch290 	Pollution of Cairnlaw Burn (SWF 08), Inshes Burn (SWF 02) and Scretan Burn (SWF 04) which feed into the SPA/Ramsar/SSSI resulting in reduced water quality resulting in mortality of its species assemblages. Dependent on the magnitude of the pollution event this could result in permanent reductions in the quality of the SPA/Ramsar/SSSI habitats and their species assemblages. Long-term, reversible and possible, this effect would be localised to the Longman Bay area of the SPA/Ramsar/SSSI.	High	Major
Longman and Castle Stuart Bays SSSI site code 1675 NH 715 496 424ha	National			High	Major
NWSS woodland	Authority	No construction phase impacts identified.			
Otter	Regional	Construction related activities, including vehicle movement in the following areas: <ul style="list-style-type: none"> Cairnlaw Burn (SWF 08); Inshes Burn (SWF 02); and Scretan Burn (SWF 04). 	Direct mortality of individuals from collisions or entrapment in pits, pipes or machinery. Unlikely to occur in sufficient numbers to affect the wider population. Although the potential impact would be short-term, the effect would be permanent and negative.	Low	Minor
		Noise, vibration and light spill associated with construction related operations including earth movement, in the areas indicated above.	Disturbance of an EPS leading to its avoidance of key places of shelter and rest. Known resting sites are situated more than 30m from the route options, it is not therefore considered that any disturbance would cause declines in population. This effect would be short-term and reversible.	Low	Minor
Water vole	Regional	Construction related activities, including vehicle movement in the following areas: <ul style="list-style-type: none"> Inshes Burn (SWF 02). 	Disturbance of water vole leading to its avoidance of key places of shelter and rest. Although presumed present this effect would be short-term and reversible.	Low	Minor
Bats	Regional	Noise and vibrations from piling, general construction noise and construction lighting within areas of overall high bat habitat potential.	Disturbance of roosts leading to avoidance of key places of shelter and rest; but no evidence at DMRB Stage 2 to suggest that this would be at a level that will cause declines in population. Effects would be short-term, reversible and frequent.	Low	Minor

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Badger	Regional	Construction related activities, including vehicle movement and vegetation clearance.	Direct injury or mortality of badgers from collisions or animals becoming trapped in uncovered holes and pipes. Mortality of individuals is permanent and negative, however given the large and wide ranging population in this area it is unlikely to have a significant effect on the status of the badger population in the area.	Low	Minor
		Noise, vibration and light spill associated with construction related operations including blasting, piling and earth movements throughout the proposed Scheme.	Temporary disturbance of badgers leading to a change in the distribution of local population(s). This effect would be negative but short-term and reversible.	Low	Minor
Aquatic Habitat – Cairnlaw Burn (SWF 08)	Regional	Construction activities for structures associated with the route options could result in run-off of contaminants or sediments in Cairnlaw Burn (SWF 08) downstream of NH 70240 45941.	Pollution leading to reduced water quality in the burn. Inputs of fine sediments smothering important substrates for aquatic species. These would cause long-term, reversible effects.	Medium	Moderate
		Changes in hydrology from over pumping of water due to construction activities for structures associated with the route options in Cairnlaw Burn (SWF 08) downstream of NH 70240 45941.	Changes in hydrology leading to functional alteration of habitat conditions in the burn. This would be a short-term, reversible effect.	Low	Minor
Fish – Cairnlaw Burn (SWF 08)	Regional	Construction activities for the route options could result in contaminated run-off or input of sediments in Cairnlaw Burn (SWF 08) downstream of NH 70240 45941.	Pollution leading to reduced water quality in the burn which can have negative physiological implications. This would cause short-term, reversible effects.	Low	Moderate
		Dewatering during construction activities for structures associated with the route options in Cairnlaw Burn (SWF 08) downstream of NH 70240 45941.	Mortality of fish from dewatering activities. This would be a permanent and negative effect.	Medium	Moderate
Operation					
Inner Moray Firth SPA, UK9001624 and Ramsar site, UK13025 NH 672 528, 580 480, 800 590, 705 473, 730 500 2,339ha	International	Increase in road run-off due to increase in impervious surfaces at the following locations: <ul style="list-style-type: none"> Cairnlaw Burn (SWF 08) ch1020/ch1140; and Scretan Burn (SWF 04) ch270/ch290. 	Pollution of Cairnlaw Burn (SWF 08) and Scretan Burn (SWF 04) which feed into the SPA/Ramsar/SSSI resulting in reduced water quality and reduction in biodiversity. This would be long-term and negative but reversible.	Medium	Major
				Longman and Castle Stuart Bays SSSI site code	National

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1675 NH 715 496 424ha					
NWSS woodland	Authority	Loss of habitat under the footprint of the route options.	Loss of NWSS woodland. This effect would be permanent and negative.	High	Moderate
Otter	Regional	Increased and new road footprint at the following locations: <ul style="list-style-type: none"> Cairnlaw Burn (SWF 08); and Scretan Burn (SWF 04). 	Direct mortality of individuals through road-traffic related incidents. This effect would be permanent and negative.	Low	Minor
		Severance of habitat by the route options, at locations indicated above.	Fragmentation of connecting terrestrial habitats leading to increase in barriers to movement and reduced access to resources for the species within the catchment. This effect would be permanent and negative.	Low	Minor
		Noise, vibration and light spill associated with operation of the road and increased traffic, at locations indicated above.	Disturbance of an EPS leading to its avoidance of key places of shelter and rest. However, as known resting sites are situated more than 30m from the route options, it is not considered that any disturbance will cause declines in population. This effect would be permanent and negative.	Low	Minor
		Increase in road run-off due to increase in impervious surfaces, at locations indicated above.	Pollution leading to decreased water quality resulting in reduced fitness of individuals and a reduction in prey resource. This effect would be permanent and negative.	Low	Minor
Water vole	Regional	No operation phase impacts identified.			
Bats	Regional	Loss of roost habitat under the footprint of the route options within areas of high and moderate bat habitat value.	Permanent loss of roost sites which could result in mortality of bats and reduced breeding success. This effect would be permanent and negative.	High	Major
		Loss of foraging and commuting habitat under the footprint of the route options within areas of high and moderate bat habitat value.	Permanent loss and fragmentation of habitat and reduced availability of foraging resources. This effect would be permanent and negative.	Medium	Moderate
		Disturbance of roosts from noise, vibration and light spill associated with operation of the road and increased traffic within areas of high and moderate bat habitat value.	Disturbance of an EPS leading to the abandonment of roost sites, increased energy expenditure during roosting periods. This would lead to reduced breeding success. This effect would be permanent and negative.	High	Major
Badger	Regional	Increased and new road footprint.	Direct mortality of badgers caused by collision with road traffic. This effect would be permanent and negative.	Medium	Moderate
		Loss of habitat under the footprint of the route	Reduction of foraging and commuting habitat within social group territories reducing the carrying capacity of the area in respect to	Medium	Moderate

		options.	badgers. This effect would be long-term and negative.		
		Severance of habitat by the route options.	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.	Medium	Moderate
		Noise, vibration and light spill associated with 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	Moderate
Aquatic Habitat – Cairnlaw Burn (SWF 08)	Regional	Loss of habitat under structures associated with the route options on Cairnlaw Burn (SWF 08) downstream of NH 70240 45941.	Loss of habitat for aquatic species. This effect would be permanent and irreversible.	High	Major
		Culverts associated with the route options create unnatural flow and substrate conditions that will fragment Cairnlaw Burn (SWF 08) downstream of NH 70240 45941.	Discontinuity in flow and substrate conditions that could discourage or prevent migration of aquatic species. Change in hydrology leading to altered substrate movement in this section of the stream and scouring of substrates at the culvert outlet. This would be a permanent effect.	Medium	Moderate
		Increase in contaminant run-off from the road near Cairnlaw Burn (SWF 08) downstream of NH 70240 45941.	Pollution leading to reduced water quality in the burn. This would be chronic and long-term.	Medium	Moderate
		Increase in sediment inputs in Cairnlaw Burn (SWF 08) downstream of NH 70240 45941 from silt collected in road drainage.	Inputs of fine sediments resulting in smothering substrates that are important for aquatic species. This effect would be recurring but short-term.	Low	Minor
Fish – Cairnlaw Burn (SWF 08)	Regional	Loss of habitat under structures such as culverts associated with the route options on Cairnlaw Burn (SWF 08) downstream of NH 70240 45941.	Permanent habitat loss resulting in fish losing access to potentially important feeding or spawning habitat. This would be a permanent, irreversible effect.	Medium	Moderate
		Culverts associated with the route options create unnatural flow and substrate conditions that may fragment the watercourses in Cairnlaw Burn (SWF 08) downstream of NH 70240 45941.	Change in hydrology leading to altered substrate movement in this section of the burn and scouring of substrates at the culvert outlet. This would discourage or prevent upstream migration by fish. This would be a permanent effect.	Medium	Moderate
		Increase in contaminant run-off from the road near watercourses in Cairnlaw Burn (SWF 08) downstream of NH 70240 45941.	Pollution leading to reduced water quality in the watercourses. This would be a chronic effect that can have long-term implications.	Medium	Moderate
		Increase in sediment inputs from silt collected in road drainage in Cairnlaw Burn (SWF 08) downstream of NH 70240 45941.	Inputs of fine sediments resulting in smothering of substrates important for juveniles and spawning adults. This effect would be recurring but short-term.	Low	Minor

12.6 Potential Mitigation

- 12.6.1 As discussed above, proposed mitigation would follow a hierarchical approach to be adopted, where possible, in the following order (CIEEM 2016 and SNH 2013):
- avoid adverse impacts in the first instance;
 - where avoidance is not possible, reduce the adverse impacts; and
 - where significant adverse residual impacts remain, measures to offset the adverse impacts at a site-specific level may be required.
- 12.6.2 It is expected that all impacts of Negligible and Minor significance would be mitigated through the application of best working practice (e.g. mitigation of potential pollution impacts through adherence to standard best practice and guidelines, such as the SEPA Pollution Prevention Guidelines (PPGs) (SEPA, 2003) and Guidance for Pollution Prevention (GPPs) (Netregs 2017)).
- 12.6.3 Significant ecological impacts (Moderate or above) are expected to be mitigated through a combination of best practice and mitigation techniques (as described below) which would be targeted to specific locations.
- 12.6.4 The following potential mitigation measures are applicable to impacts arising from all route options as described in Table 12.7.

Construction

- 12.6.5 Potential for disturbance (noise, vibration and lighting) to protected species could be reduced for all route options by measures such as:
- careful routing of site access routes and creating exclusion zones in sensitive areas;
 - use of directional lighting;
 - use of noise and vibration management plans (avoiding sensitive times) to minimise negative effects on protected species;
 - soft start techniques for piling procedures; and
 - limits on hours of darkness working where feasible and where need confirmed in discussion with SNH.
- 12.6.6 Best practice guidance could be set out in a contractor's Construction Environmental Management Plan (CEMP) which would outline how construction of the project would avoid, minimise or mitigate effects on the environment and surrounding area.
- 12.6.7 Potential fragmentation (physical or functional) of aquatic habitats through in-channel works and culvert installation and the resultant loss of populations of aquatic species, could be reduced through:
- avoiding sensitive time periods for protected species such as spawning and migration periods;
 - works being carried out in accordance with SEPA's Engineering in the Water Environment: Good Practice Guide - River Crossings (2010) to ensure fish passage is maintained during construction; and
 - relocation of fish present within the culvert extension/installation footprints.
- 12.6.8 Disturbance to roosting bats, fish and otters could be reduced through:
- the provision of appropriate protection systems and/or construction exclusion zones; and

- use of noise management plans (avoiding sensitive times) to minimise negative effects on fish species (all three lamprey species, European eel).

12.6.9 The risk of mortality of species such as otter when travelling through construction areas could be avoided or reduced by provision of mammal-proof fencing to mitigate for direct mortality during construction along with standard best practice site management, e.g. covering holes and pipes.

Operation

12.6.10 Potential habitat loss (under project footprint) could be reduced or compensated through:

- the provision of new habitat in landscape design and if necessary through off-setting, aiming to reduce fragmentation (of habitats and their supporting species) and creating new linkages or more ecologically resilient functional units thereby increasing the amount of supporting habitat for terrestrial and aquatic species. Any potential replacement habitat would be identified for the preferred option at DMRB Stage 3.

12.6.11 Road run-off and its potential effects on watercourses and other aquatic habitats could be mitigated by appropriate drainage design to minimise run-off of sediments directly into the watercourse. It should be noted that Sustainable Drainage Systems (SuDS) would be developed as part of the DMRB Stage 3 design.

12.6.12 Potential for loss and/or fragmentation of protected species lying-up/resting/roosting sites under the project footprint could be compensated for through:

- the provision of alternative sites; and
- planting to provide opportunities for above ground lying-up sites and foraging habitat for other species.

12.6.13 Potential fragmentation of otter, badger and bat habitats and associated barriers to access foraging areas could be mitigated for through:

- the provision of mammal ledges in culverts and under bridges for otter and badger. Where this is not possible, dry mammal underpasses could be provided;
- away from watercourse crossings, provision of dry mammal underpasses at appropriate crossing points for badger; and
- design of new landscape planting suitable for use by commuting bats.

12.6.14 Loss of migratory fish passage due to the presence of additional culverts could be reduced through the design of crossings in accordance with SEPA's Engineering in the Water Environment: Good Practice Guide - River Crossings (2010).

12.6.15 Operational disturbance to bats, otters, badgers and migratory fish species could be reduced through measures such as:

- design of artificial lighting using current best practice, including directional lighting or other measures to reduce peripheral light spillage; and
- avoidance of lighting in areas of migratory fish habitat at watercourse crossings.

12.6.16 Direct mortality of otters and badgers crossing the road is not considered likely if appropriate design of river crossings and dry mammal underpasses is applied (and so has not been discussed above). However, if deemed appropriate for the preferred option at DMRB Stage 3, it could be avoided through provision of mammal-proof fencing.

12.7 Summary of Route Options

- 12.7.1 This section provides a summary of the DMRB Stage 2 assessment of impacts for the route options taking into account the anticipated potential mitigation as described in Section 12.6.
- 12.7.2 Two aspects are considered; whether any impacts would be considered significant in the context of the EIA Regulations, and whether any of the impacts identified differ sufficiently between route options that they need to be considered as part of the overall identification of a preferred option (which as explained in Chapter 7: Overview of Environmental Assessment, takes into account environmental, engineering, economic and traffic considerations).
- 12.7.3 This assessment has identified significant potential impacts, in the context of the EIA Regulations, associated with the route options as shown in Table 12.7.
- 12.7.4 A comparative assessment is provided in Table 12.8 to indicate the preference of the route options assessed in terms of ecology and nature conservation.
- 12.7.5 Options 1A and 3A are predicted to have the lowest impact on ecology and nature conservation. The other route options would all result in the loss of a greater area of high value bat habitat at the tie in with the A96 at the Smithton Junction (Options 1B, 2B and 3B) or as a result of the additional slip road on the southbound side of the A9 (Option 2A) (an impact of Major/Moderate significance) than Options 1A and 3A. Options 1B, 2B and 3B would also result in the loss of a greater area of habitat used by badger, including an outlier sett (an impact of Moderate significance) and as such are expected to have the highest impact on ecology and nature conservation.

Table 12.8: Ecology and Nature Conservation Comparative Assessment

Route Option	Lowest Impact	Intermediate	Highest Impact
1A	✓		
1B			✓
2A		✓	
2B			✓
3A	✓		
3B			✓

- 12.7.6 Following the implementation of appropriate mitigation (Section 12.6) no significant residual impacts, are anticipated for any of the route options.

12.8 Scope of DMRB Stage 3 Assessment

- 12.8.1 The DMRB Stage 3 assessment for Ecology and Nature Conservation will be undertaken in accordance with the DMRB (Volume 11, Section 3, Part 4) including the following:
- further field surveys will include, badger, otter, breeding bird, aquatic macroinvertebrates;
 - further surveys will also include bat emergence and re-entry surveys of buildings and structures with high bat roost potential;
 - assessment of the preferred option's nature conservation impacts and their significance, on terrestrial and aquatic habitats, and protected species;
 - consideration of design changes or works to mitigate potential adverse impacts, including any which would be required prior to construction;
 - confirmation of the views of relevant statutory bodies on the nature conservation impacts of the preferred option;

- identification of required mitigation, including provision for species to pass across the A9/A96 route and replacement habitat planting; and
- production of an Environmental Statement (ES) detailing the information obtained from the points above and identifying any potential residual impacts for ecology and nature conservation.

12.8.2 In addition to preparation of the ES, a Habitats Regulations Appraisal will be prepared to consider the implications from the project on the Natura 2000 network, in particular the Inner Moray Firth SPA and Ramsar, under the requirements of the Habitats Regulations 1994 (as amended in Scotland).

12.9 References

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