10 Ecology and Nature Conservation

The Northern Leg of the proposed scheme passes through a diverse range of habitats. Although most of these are of relatively low ecological value, important habitats are present at a number of locations, including the Scottish Agricultural College Campus at Craibstone, Kirkhill Forest, the River Don valley, the Goval Burn area, Red Moss (Parkhill), and Corby and Lily Lochs.

Key potential impacts would be likely to occur at Craibstone, which is an important area supporting woodland and riparian habitats as well as protected species including otters, bats, birds, badgers and red squirrels. Potential impacts include habitat loss, fragmentation, and severance. These impacts would be particularly significant on the local red squirrel population, as approximately two thirds of the suitable habitat that supports the existing population would be lost. New planting and management of existing woodlands to favour red squirrels over grey squirrels is proposed to reduce impacts on this protected species.

Key potential impacts would be likely to occur at Kirkhill Forest and surrounding woodlands, which are important for badgers, bats, birds, and red squirrels. Potential impacts associated with habitat loss, fragmentation, and severance would be particularly significant on the local badger and red squirrel populations. In addition to the creation of woodland habitat and management of existing woodlands in this area, the provision of a wildlife-only bridge and a multiple-use bridge with 'green', wildlife-friendly vegetated strips is an important component of the mitigation and will aim to maintain connectivity for wildlife.

Other potential impacts as a result of habitat loss and fragmentation would be likely to be most important where the proposed scheme would affect burns and associated riparian habitat, which are important to freshwater ecology and also provide wildlife corridors. The most important of these are the River Don, Goval Burn and Bogenjoss Burn. Fragmentation impacts at the River Don and Goval Burn are reduced by the provision of bridge structures. However, impacts of Moderate residual significance at Bogenjoss Burn are predicted due to realignment of the watercourse and the construction of two culverts.

Additional impacts are associated with impacts on localised fragments of woodland and heathland habitat, and where the proposed scheme would result in potential fragmentation of bat flight routes and foraging areas. Although, in general, residual impacts are not expected to be significant, at several locations licences will be required during construction for protected species (e.g. exclusion of badger setts, and exclusion/disturbance of otter holts/couches and bat roosts).

10.1 Introduction

10.1.1 Ecology is defined as the scientific study of the processes that influence the distribution and abundance of organisms, and the interactions between those organisms and their environment. Nature conservation is the maintenance of viable populations of fauna and flora and the habitats and communities to which they belong.

10.1.2 The objectives of nature conservation are:

- the maintenance of diversity and landscape character, including wildlife communities and important geological and physical features; and
- the maintenance of viable populations of native species throughout their traditional distribution range, and the improvement of the status of rare or endangered species.

10.1.3 Habitat fragmentation and loss as the result of development can have profound effects on the nature conservation value of an area. These impacts are most significant in semi-natural habitats that were formerly widespread, but now reduced to variable sized patches within a landscape of other land uses (English Nature, 1994). The habitats most affected are woodlands, heathland and species-rich grasslands. Plant and animal populations likely to be affected are those that maintain their genetic diversity by moving between habitat patches in the landscape. Some species (e.g. bird species) can move readily between habitat patches; however, populations of less mobile species (e.g. plants and some other animals) can become isolated by fragmentation, and may be

severely affected when habitat patches are so reduced that they can no longer support viable populations.

10.1.4 This chapter presents the results of the DMRB Stage 3 ecology surveys and assessment. To aid the interpretation of the assessment, the Northern Leg has been further sub-divided based on habitat boundaries (either man-made such as existing roads or due to habitat changes such as wooded areas changing into intensive agriculture) as follows:

- Section NL1: ch314800 – 316000 (Derbeth to Tulloch Road);
- Section NL2:ch316000 – 317400 (Scottish Agricultural College [SAC] Craibstone);
- Section NL3: ch317400 – 322600 (A96 to Nether Kirkton);
- Section NL4: ch322600 – 325370 (Nether Kirkton to Corsehill); and
- Section NL5: ch325370 – 331000 (Corsehill to Blackdog).

Legislative and Policy Framework

International Conventions and Directives

The Bern Convention

10.1.5 The requirements of the Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention) came into force in 1982. The Convention imposes legal obligations to protect over 500 wild plant species and more than 1000 wild animal species. These requirements are implemented in UK law through the Wildlife and Countryside Act (1981), as amended (see below).

The Convention on Biological Diversity (CBD)

10.1.6 The Convention on Biological Diversity was adopted at the Earth Summit in Rio de Janeiro, Brazil in June 1992, and entered into force in December 1993. It was the first treaty to provide a legal framework for biodiversity conservation, with three main goals: the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising from the use of genetic resources. Contracting Parties are required to create and enforce national strategies and action plans to conserve, protect and enhance biological diversity. The UK government ratified the Convention and published the UK BAP in 1994, and to compliment the UK BAP, separate biodiversity strategies for each of the devolved governments have been subsequently launched including the Scottish Biodiversity strategy, launched in 2004.

Water Framework Directive (WFD)

10.1.7 The EU Water Framework Directive (2000/60/EC) recognises that ecosystem health is the most effective way to assess the environmental quality status of a watercourse. The WFD requires that all watercourses in Europe do not deteriorate from their current condition and reach at least ‘good’ ecological status by 2015.

Natura 2000

10.1.8 Natura 2000 comprises a network of ecologically valuable designated areas in Europe. This network is established under the terms of the EU Directive 92/43/EECC ‘Conservation of Natural Habitats and of Wild Fauna and Flora’ (Anon., 1992). The main aim of the Habitats Directive is ‘to promote the maintenance of biodiversity’ through the protection of habitats or species. Annex I of the Directive lists habitats and Annex II lists species for which sites are designated.

10.1.9 The network comprises Special Areas of Conservation (SAC) designated under the Habitats Directive, and Special Protection Areas (SPA) designated under EU Directive 79/409/EEC ‘Conservation of Wild Birds’ (The Birds Directive; Anon., 1979).

National Legislation

The Wildlife and Countryside Act 1981 (WCA) as amended

10.1.10 The WCA (1981) (as amended) is the principal mechanism for wildlife protection in the UK, originally aimed at consolidating and amending previous legislation to implement the requirements of the Bern Convention and the Birds Directive. Of particular relevance is Schedule 1, which lists birds afforded special protection, Schedules 4-6, which protect various wild animal species from injury, killing or disturbance, and Schedule 8, which confers protection to certain plant species. The statutory designation of Sites of Special Scientific Interest (SSSI) is the main site protection measure in the UK established under the WCA.

The Conservation (Natural Habitats & c.) Regulations 1994

10.1.11 These Regulations place a duty on planning authorities to meet the requirements of the Habitats Directive, and to provide protection for priority habitats and species listed in the Habitats Directive outside of protected areas.

Nature Conservation (Scotland) Act 2004.

10.1.12 This Act requires Scottish Ministers to publish a list of habitats and species considered to be of principal importance for biodiversity. This list, the Scottish Biodiversity List, was subsequently published in 2005 and is intended to be a tool for public bodies and others doing their Biodiversity Duty and as an important source of information and guidance for all.

10.1.13 The Act has three parts, Part 1 promotes the conservation of biodiversity whereby all Scottish public bodies and office holders will be obliged to 'further the conservation of biodiversity' in the course of exercising their functions.

10.1.14 Part 2 revises the designation of the SSSI system for protecting Scotland's most precious natural places.

10.1.15 Part 3 enhances the existing species protection provisions of the WCA (1981), as amended by adding the word 'recklessly' to legislation regarding killing, injury or disturbance of protected species so that 'intent' no longer needs to be proven.

Water Environment and Water Services (Scotland) Act 2003 (WEWS)

10.1.16 The WEWS (Scotland) Act (2003) was the first act in Scotland to implement the Water Framework Directive (WFD). This Act has subsequently been augmented by the Controlled Activities Regulations (CAR) as stated below. This act sets out the key principles and instructions for WFD implementation in Scotland, for example confirming the Scottish Environment Protection Agency (SEPA) as leading the River Basin Planning and Characterisation Processes and implementing the majority of necessary regulatory controls.

Water Environment (Controlled Activities) (Scotland) Regulations 2005 (CAR)

10.1.17 This act is the implementation in Scotland of the WFD as detailed above. These Regulations came into force in April 2006, and apply to inland waters and wetlands linking to lochs or rivers (although they may be extended to cover all wetlands). CAR is based on a three-tier system. General Binding Rules (GBRs) outlines low risk activities for which, if best practice is followed, no further action is required. Registration of activities is required for activities not covered by GBRs that pose a low risk individually, but cumulatively could cause harm. Licensing by SEPA is required for all other purposes.

Non-Statutory Guidance

National Planning Policy Guidance (NPPG) 14: Natural Heritage

10.1.18 This NPPG gives guidance on how the Government's policies for the conservation and enhancement of Scotland's natural heritage should be reflected in land use planning. The guidance states that there may be opportunities to enhance the natural heritage through the development process by careful siting and design of developments, and by providing for wildlife on development sites and that natural heritage is a material consideration in the assessment of development proposals.

Planning Advice Note (PAN) 60: Planning for Natural Heritage

10.1.19 This PAN provides guidance on good practice in relation to conservation and natural heritage in Scotland. It covers the protection of biodiversity, designated sites and the wider natural heritage, with the provision that all development effects can be material considerations in the planning process. It includes the provision that full regard should be given to the natural heritage in development control, that mitigation is required for any adverse effects, and that the precautionary principle should be applied where development effects are uncertain.

Biodiversity Action Plans

10.1.20 The UK Biodiversity Action Plan (BAP) (1994) was established in response to the Global Convention on Biological Diversity (1992). Individual Action Plans define actions and measures to meet the objectives defined in the strategy, and specify measurable targets. They determine the broad habitats and species that are of value to the natural environment of the UK, and to identify actions and projects that could be undertaken to help protect or enhance the national biodiversity.

10.1.21 Local Biodiversity Action Plans (LBAPs) are implemented through planning policy, identifying habitats and species of particular value or endangerment at the local or regional level. The North East Scotland Biodiversity Action Plan (NES BAP) covers Morayshire, Aberdeenshire and Aberdeen City. BAPs in the UK have no statutory status, but provide a framework for implementing conservation requirements.

Locally Important Sites

10.1.22 District Wildlife Sites (DWS) and Sites of Interest to Natural Science (SINS) are sites of local conservation interest designated by local planning authorities. Such sites are afforded a measure of protection in local development plans (Chapter 19: Policies and Plans).

10.2 Approach and Methods

Overview of Approach

10.2.1 The DMRB Stage 3 ecology surveys and assessment of impacts for the AWPR involve a process of Ecological Impact Assessment (EcIA) that is based on a matrix approach. This system of EcIA has been previously adapted for road construction projects and is recommended in Transport Analysis Guidance documents such STAG and the Highways Agency's guidance WEBTAG.

10.2.2 The matrix approach to EcIA involves three stages:

- firstly, all ecological features are evaluated in terms of their ecological importance and/or conservation value;
- the magnitude of the impacts on these features is assessed according to a simple scale; and
- finally, the significance of the impacts is determined by combining the information on the ecological importance of the feature with the magnitude of the impacts upon it.

10.2.3 The three stages of EcIA have been modified to be directly applicable to the proposed scheme, and are based on matrices from an early draft version of IEEM guidance on EcIA (IEEM, 2002) and Transport Advisory Guidance (STAG and WEBTAG). The bulk of the assessment for the AWPR Northern Leg was undertaken before the 2006 issue of the IEEM guidelines. This assessment therefore follows the general approach described in the IEEM 2002 guidelines, with cognisance of the later 2006 guidelines.

Scope of Assessment

10.2.4 The scope of this ecology assessment was determined through scoping and consultation with statutory and non-statutory bodies (see paragraph 10.2.8).

10.2.5 Detailed ecological assessments were undertaken for habitats and a range of rare or protected species, as agreed with SNH. Assessment results are provided as technical appendices, with information summarised and included within this chapter as appropriate:

- A10.1 – Terrestrial Habitats;
- A10.2 – Badger;
- A10.3 – Bats;
- A10.4 – Breeding Birds;
- A10.5 – Wintering Birds;
- A10.6 – Otter;
- A10.7 – Red Squirrel;
- A10.8 – Water Vole;
- A10.9 – Amphibians;
- A10.10 – Brown Hare;
- A10.11 – Deer;
- A10.12 – Reptiles;
- A10.13 – Terrestrial Invertebrates;
- A10.14– Water Shrew;
- A10.15 – Fish; and
- A10.16 – Freshwater (includes Freshwater Habitat and Freshwater Invertebrates).

10.2.6 All assessments were undertaken by Jacobs (refer to Table 10.1). Northern Ecological Services were contracted to prepare baseline information for inclusion in the ES, and to review the technical reports. Specialist reviews of Appendix A10.2 (Badger) and Appendix A10.6 (Otter) were also undertaken by Mr. Mike Harris (Grampian Badger Survey) and Dr. Hans Kruuk, respectively. Dr. Jochen Langbein provided advice for Appendix A10.11 (Deer).

Baseline Conditions

10.2.7 Ecological baseline conditions were identified using two methods, described in more detail below:

- consultation and literature review; and
- field survey.

10.2.8 The names and qualifications of the ecology team are provided below in Table 10.1.

Table 10.1: Lead Surveyors/Responsibilities

Responsibility	Name and Relevant Qualifications
Ecology Team Leader	Peter Gilchrist BSc (Hons) PhD PGC, Res Sup MIEEM CEnv Graham Rankin BSc (Hons) MSc MIEEM Rebecca Hewlett BSc (Hons) MSc MIEEM (2004-2006) Jonathan Huckle BSc (Hons) MSc PhD MIEEM (2004-2006) Martina Girvan BSc (Hons) MSc PhD MIEEM (2006)
Ecology Assessment	Peter Gilchrist BSc (Hons) PhD PGC Res Sup MIEEM CEnv Graham Rankin BSc (Hons) MSc MIEEM Martina Girvan BSc (Hons) MSc PhD MIEEM (2006)
Survey Scoping and Coordination	Graham Rankin BSc (Hons) MSc MIEEM
Phase 1 Habitat and NVC	Chris Smilie BSc (Hons) MSc MCSM MIEEM PhD Jonathan Huckle BSc (Hons) MSc PhD MIEEM (2004-2006)
Badger	Richard Roe BSc (Hons) MSc MIEEM
Bats	Claire Hopkins BSc (Hons) MSc AIEEM (Licensed Bat Worker)
Breeding Birds	Graham Rankin BSc (Hons) MSc MIEEM
Wintering Birds	Graham Rankin BSc (Hons) MSc MIEEM Jon Durward BSc (Hons) MIEEM (2004-2006)
Otter	Jon Guarnaccio BSc (Hons) MSc MIEEM
Red Squirrel	Kate Finlinson BSc (Hons) MSc AIEEM Jon Durward BSc (Hons) MIEEM (2004-2006)
Water Vole	Richard Roe BSc (Hons) MSc MIEEM
Amphibians	Mark Jackson BSc (Hons) MRes MIEEM
Brown Hare	Mark Jackson BSc (Hons) MRes MIEEM
Deer	Mark Jackson BSc (Hons) MRes MIEEM
Reptiles	Mark Jackson BSc (Hons) MRes MIEEM
Terrestrial Invertebrates	Colin Nisbet BSc (Hons) MSc Martina Girvan BSc (Hons) MSc PhD MIEEM (2006)
Water Shrew	Richard Roe BSc (Hons) MSc MIEEM
Fish	Gillian McCoy BSc (Hons) MSc PhD MIEEM Stuart Clough BSc (Hons) PhD (2004 – 2005)
Freshwater Habitat	Rachel Wilson BSc (Hons) MSc AMIBIOL LMIFM Rebecca Hewlett BSc (Hons) MSc MIEEM (Accredited River Habitat Surveyor) (2004-2006)

Consultation and Literature Review

10.2.9 The following organisations were consulted with regard to ecology and nature conservation to obtain data and to assist in the identification of key issues:

- Aberdeen Bat Group;
- Aberdeen City Council;
- Aberdeen University (Department of Zoology);
- Aberdeenshire Council;
- Botanical Society of the British Isles (BSBI);
- British Trust for Ornithology (BTO);
- Centre for Ecology and Hydrology (CEH);

- Don District Salmon Fisheries Board (DonDSFB);
- Forestry Commission;
- Grampian Badger Survey;
- Grampian Red Squirrel Group;
- National Biodiversity Network (NBN);
- North East Scotland (NES) Biodiversity Audit;
- North East Scotland Local Biodiversity Action Plan (NES LBAP) Coordinator;
- North East Scotland Biological Records Centre (NESBReC);
- Royal Society for the Protection of Birds (RSPB);
- Scottish Environment Protection Agency (SEPA);
- Scottish Natural Heritage (SNH);
- Scottish Ornithologist's Club (SOC);
- Wildfowl and Wetlands Trust (WWT);
- Local Herpetofauna Recorder; and
- Scottish Wildlife Trust (SWT).

10.2.10 Responses are summarised in Chapter 6 (Scoping and Consultation), with further details provided in Appendix A6.1. Those of specific relevance to ecology are identified within the relevant Section of this chapter and Appendices as appropriate.

10.2.11 Three key publications were used extensively as a guide to the character and distribution of nationally and locally important habitats and species within Aberdeenshire, and particularly within the study area:

- the UK BAP as set out in the Biodiversity Steering Group Report (Vol. 2; 1995) - information included on the 45 habitats and 391 species included in the UK BAP due to rarity, decline or other importance;
- the North East Scotland LBAP (NES LBAP) - information on the habitats and species identified as local priorities within North East Scotland; and
- the North East Scotland Biodiversity Audit (Alexander et al., 1998) - information on status and range of species and habitats in Aberdeen city, Moray and Aberdeenshire.

10.2.12 In addition to these documents, a review was also undertaken of relevant literature on species and habitat abundance, distribution and susceptibility to impacts. Best practice guidance was also taken into account during the formulation of appropriate survey methods, as referenced for each field survey described below and in Appendices A10.1 to A10.16.

10.2.13 A search of the internet sources of information was also undertaken as part of the literature review including: SNH Lowland Raised Bog Inventory Data, the UK BAP, the North East of Scotland Biodiversity Audit, NES LBAP priority and locally important habitats and species, and citations for sites designated at the local, national and international levels.

Field Survey

10.2.14 The study area for each survey generally extended to a minimum of 500m to each side of the proposed scheme (i.e. a 1km wide study corridor). Study corridors referred to below were centred on the proposed alignment unless otherwise stated. Variation in study corridor width was dependent on the habitat or target species as identified in the methods summary below, and was consistent with best practice as determined by the appropriate governing or professional body (including SEPA and IEEM), and/or as described in DMRB Volume 11 (Highways Agency, 2001a).

10.2.15 The ecological survey methods used also followed current best practice, based on guidance from IEEM (2002) and/or DMRB. Prior to undertaking fieldwork, the approach and methods were agreed with SNH following consultation and submission of an ecological scoping report (Babtie Group, 2003). Previous survey extent and results were reviewed by the Jacobs ecology team in 2007 to confirm that they remained appropriate for completing the assessment of the current proposed scheme design.

10.2.16 Brief summaries of the methods used are presented below, with full details provided in the respective technical reports (Appendices A10.1 to A10.16).

Terrestrial Habitats

10.2.17 Habitats were assessed, coded and mapped using the survey methods outlined in the 'Handbook for Phase 1 Habitat Survey – a technique for environmental audit' (Joint Nature Conservation Committee [JNCC]; Parkins, 1993). A Phase 1 Habitat Survey of a 1km wide study corridor centred on the proposed route alignment was undertaken between May and July 2004 following guidance contained within DMRB. Because of the evolving nature of the road design, a wider study area was surveyed where alternative junctions and river crossings were being considered to ensure sufficient survey data coverage.

10.2.18 To aid the interpretation of the habitat assessment, the Northern Leg and its component route sections were sub-divided into Habitat Areas based on the features present and their location within the study corridor (Figures 10.2a-g). Several Habitat Areas may occur in each section of the route (e.g. a network of agricultural fields and areas of woodland).

Badger

10.2.19 Badger activity was surveyed within a 1km wide study corridor between March and May 2004 following the methods outlined by Harris et al. (1989) and DMRB. In accordance with this guidance, where signs of badger activity were extensive, the study corridor was extended beyond 1km, ensuring that territories of all potentially impacted badger social groups were correctly identified.

10.2.20 Signs of badger activity were mapped with reference to data from the Phase 1 Habitat Survey to provide information about badger social group territories. Certain areas were found to have particularly high levels of badger activity, and field signs were therefore too numerous to be able to accurately map badger territories. Bait marking, using methods outlined by Delahay et al. (2000) was therefore undertaken in these areas from March to April 2005 to assist with the delineation of territories. The results were used to augment data from the activity surveys of the previous year.

Bats

10.2.21 The aims of the bat surveys were to identify roosts, commuting routes and foraging areas. To achieve this, a habitat assessment was undertaken to identify potentially important areas for bats, followed by surveys of key areas to assess the level of bat activity.

10.2.22 The habitat assessment of a 1km wide study corridor was undertaken in summer/autumn 2004 and spring 2005, to identify potential roosts within natural and/or man-made structures (excluding mines) and to inform the scope of the bat activity surveys. The habitat assessment followed methods outlined by Walsh and Harris (1996a, b), Entwistle et al. (1997), Jenkins et al. (1998), Highways Agency (2001b) and Mitchell-Jones (2004).

10.2.23 Emergence surveys of roosts/potential roosts and activity surveys of habitats identified during the habitat assessment were undertaken between May and July 2004, September and October 2004, and in May 2005 following methods outlined in the DMRB (Highways Agency, 2001b) and Mitchell-Jones (2004).

Breeding Birds

10.2.24 A two-stage survey strategy (agreed with SNH, refer to Jacobs Ecological Scoping Report, 2006) was developed to select bird survey areas within a 1km wide study area (500m either side of the centreline of the proposed route). The first stage in the selection process involved the identification and selection of high value habitats referred to as Sites of Ornithological Value (SOV). These were identified by experienced ornithologists, based on an initial walkover survey together with an assessment of data supplied by the NESBReC and analysis of aerial photographs and OS maps.

10.2.25 The second stage in the selection process involved the use of a Line Transect and Quadrat sampling system to obtain a representative sample of remaining habitats outside of the SOVs. This was used to infer the importance of all remaining non-surveyed areas throughout the route corridor for breeding birds. A single, 500m wide transect was established along the centre of the study area along which 500m square Quadrats were systematically arranged and sampled at a ratio of 1:3.

10.2.26 Selected SOVs and Quadrats were subject to an adapted breeding bird survey (BBS) (based on the Common Bird Census (CBC) standard mapping technique as developed by the British Trust for Ornithology (Bibby et al., 2000). Observations of key species present within or adjacent to each of the SOV and Quadrat, in addition to the wider study area, were noted during the other ecological surveys for the proposed scheme.

10.2.27 The ecological value of each SOV and Quadrat for breeding birds was determined by professional judgment taking into account the evaluation of its habitat potential for breeding birds (derived from information in the Terrestrial Habitat report (Appendix A10.1) combined with the value of the breeding bird assemblage present.

10.2.28 An assessment was then made as to how representative the habitats found in each Quadrat or SOV were of the adjacent, non-surveyed areas. The ecological value of the remaining Habitat Areas in each route section was then determined, by an initial evaluation of their habitat potential for breeding birds combined with the knowledge of the breeding bird assemblages found in adjacent representative Quadrats or SOVs.

Wintering Birds

10.2.29 The wintering bird survey aimed to assess the status of wintering bird assemblages through a combination of the assessment of an identified Waterbody of Ornithological Value (WOV), selected quadrats and incidental observations within the study corridor. The following three survey methods were employed to evaluate the importance of the habitats:

- Five counts each month at dawn, midday and dusk, from November 2004 to March 2005, at Corby, and Lily Lochs (WOV), which were known to support wintering birds.
- Quadrat sampling to survey wintering bird species within the 500m study corridor. The study corridor was divided into 39 (500m x 500m) quadrats. A sampling ratio of 1:3 was then used to select 13 quadrats along the transect. A Wintering Bird Survey (WBS) was undertaken in the 13 quadrats from November 2004 to February 2005, based on the standard mapping technique of the CBC as developed by the BTO (Bibby et al., 2000).
- Incidental observations of agricultural fields, any associated wetlands and areas of standing water to identify the presence of any waders, wildfowl or geese during the migration period in March 2005.

10.2.30 It should be noted that the subdivision of the route into 39 quadrats in contrast to the 33 breeding bird survey quadrats is a result of the study corridor being extended to incorporate additional habitat potentially suitable for wintering birds.

Otter

10.2.31 The otter survey aimed to identify holts, couches, other lying up areas, commuting routes and foraging areas within the study area. A survey of otter activity in a 1km wide study corridor was

undertaken in May 2004 and from January to March 2005, following methods outlined by Kruuk (1995) and DMRB. This survey concentrated on, but was not exclusive to, watercourses and wetlands.

10.2.32 All watercourses and waterbodies including lochs, burns, rivers, field drains and ditches within the 1km route corridor were surveyed for signs indicative of the presence of otters, including:

- otter spraint;
- footprints;
- actual or potential resting sites. These include underground 'holts' (e.g. beneath the roots of bankside trees) or above ground 'couches' (e.g. in reedbeds);
- slides or other well-used access points to watercourses (though additional evidence would be required to positively confirm their use by otters);
- feeding remains, e.g. fish carcasses (though additional evidence would be required to positively confirm these as evidence of otter presence); and/or
- sightings, including otter Road Traffic Accidents (RTAs) and anecdotal evidence supplied by landowners.

10.2.33 In general, otter surveys only attempted to identify the terrestrial habitats of otters lying within 10m of a watercourse. In some areas where otter signs were abundant, the survey was extended to include adjacent habitats and to identify tracks leading from the watercourse. Incidental observations of tracks and signs were also made throughout the survey period.

Red Squirrel

10.2.34 Red squirrel surveys were conducted to determine the presence or absence of red squirrels and to identify areas of woodland supporting red squirrels. Due to the extent of the study area, and methodological difficulties in accurately assessing red squirrel population size, level of use of various habitats by this species was not quantified. To determine the presence/absence of red squirrels, a visual survey and hair-tube survey was undertaken in woodlands previously determined by walkover surveys as suitable red squirrel habitat within a 1km wide study corridor. The surveys were performed between May and July 2004 and during June 2005, following methods outlined by Gurnell et al (2001).

10.2.35 Hair-tube surveys collect squirrel hair on a sticky medium as they pass through baited tubes. Squirrel hairs collected were stained and viewed under a high-powered microscope to distinguish red or grey squirrel hairs, following methods outlined by Teerink (1991), Gurnell and Pepper (1994) and Dagnall et al. (1995).

Water Vole

10.2.36 DMRB does not outline specific guidance for water vole survey techniques. Therefore the survey methodology adopted followed that described in the Water Vole Conservation Handbook (Strachan, 1998).

10.2.37 All riparian zones, watercourses and standing waterbodies within 250m of the proposed alignment were surveyed for evidence of water vole occupation. These were identified from OS maps, aerial photographs and through a preliminary walkover survey. Survey locations are detailed in Appendix 10.9 and presented in Figures 10.8a-g.

10.2.38 All watercourses and ponds were surveyed from the channel/pond where possible to give the best view of bank habitat. This was possible for all waterbodies apart from some deeper sections of the River Don. The survey comprised searching for field signs as described in Strachan (1998), which included burrows, latrines, footprints and feeding stations.

10.2.39 The habitat suitability of waterbodies for water voles was assessed using landscape factors known to be conducive to supporting water vole colonies (Strachan, 1998; Woodroffe, 2000).

Amphibians

10.2.40 Amphibian surveys aimed to identify suitable ponds and to determine the species using these habitats including the presence or absence of the protected great crested newt.

10.2.41 Potential amphibian breeding ponds and/or other waterbodies present within a 500m study corridor were identified through consultation and the analysis of aerial photographs and OS maps. All potential waterbodies were visited in March 2004 to record the presence/absence of standing water and assess habitat suitability for amphibians following methods set out in Oldham et al. (2000).

10.2.42 Surveys of suitable ponds were undertaken between April and July 2004 to determine the presence or absence of amphibian species within or adjacent to each identified pond/waterbody following methods described by Gent and Gibson (1998) and English Nature (2001).

Brown Hare

10.2.43 Brown hare presence within a 500m study corridor was assessed through the collation of incidental records made during all other floral/faunal surveys over a 15-week period. Data relating to the size and types of habitat within the study area were determined through review of the Phase 1 Habitat maps, to enable a general assessment of the suitability of the study area for brown hares.

Deer

10.2.44 Deer populations within the route corridor were estimated by collating incidental records made by the team of ecologists while conducting floral/faunal surveys over a 15-week period between March and July 2004 and over a 25 week period between 14 February 2006 and 24 August 2006. Most surveys were conducted during daylight hours, with some in the early morning and late evening. Records included observations of field signs such as moulted hair, lair depressions, droppings, prints (slots) and tracks, plus any sightings of adult or juvenile deer.

10.2.45 Records of road casualties collated by Grampian Police and the Aberdeenshire Council Roads Department were obtained for 2003 and 2004 from the deer collision records of the National Deer Collisions Project.

10.2.46 A site survey was conducted on 17-18 August 2004 by Dr Jochen Langbein (specialist deer consultant) to verify the collated information, and to assess local habitats and levels of activity.

Reptiles

10.2.47 A preliminary habitat assessment within a 250m wide study corridor either side of the proposed scheme was undertaken using OS maps to identify habitats of potential value to reptiles and to identify potentially suitable Habitat Areas for walkover surveys. Walkover surveys of the habitats identified and defined the number of sites that were surveyed for reptiles.

10.2.48 Artificial refugia were laid out at a density of 50 per hectare. A total of 140 carpet tiles and 70 roofing felt tiles were divided amongst the 26 identified reptile habitat sites within the route alignment and after bedding in for 10 days were checked on six survey visits during September 2004.

Terrestrial Invertebrates

10.2.49 Due to the large numbers of individuals and species of this taxon present in the study corridor, systematic surveying for terrestrial invertebrates was not practical. Instead, the assessment of potential impacts on terrestrial invertebrates was based on the habitat potential of sites to support terrestrial invertebrates throughout the proposed route corridor. The assessment focussed on

habitats suitable for important species, including those identified in the NES LBAP (North East Biodiversity Audit; Alexander et al., 1998).

10.2.50 Phase 1 Habitat Survey maps and target notes (Appendix A10.1) were used to assess nature conservation potential for invertebrates. A walkover survey was undertaken at the following sites with a high potential for terrestrial invertebrate habitats:

- Brimmond Hill (DWS);
- Gough Burn (DWS);
- Craibstone;
- Goval Wood;
- Red Moss (Park Hill) Lowland Raised Bog Inventory (LRBI); and
- Corby Loch (part of composite Corby, Lily and Bishops Loch SSSI, DWS).

Water Shrew

10.2.51 Watercourses, standing waterbodies and riparian zones potentially suitable for water shrew were identified through analysis of OS maps and/or aerial photographs, followed by a reconnaissance survey. A survey of all water features identified as being potentially suitable was subsequently undertaken using baited tubes within a 500m study corridor between June and July 2004 following methods outlined by Churchfield et al. (2000). Over 175 survey tubes were placed on the bankside and recovered, and were investigated for droppings.

Fish

10.2.52 Surveys aimed to identify the likely presence of fish species (including lamprey and eels) in watercourses potentially affected by the proposed scheme. This represents a precautionary approach to allow for the fact that survey results not indicating fish presence may not be conclusive. If it was considered possible for a particular species to be present in a watercourse, it was assumed to be present for the purposes of the impact assessment and mitigation strategy.

10.2.53 An initial walkover survey and habitat assessment of watercourses crossed by the proposed scheme was undertaken in August 2004, during which *in-situ* water quality measurements were also taken. A second walkover survey was undertaken in January 2005 during which salmon spawning habitat was identified and evaluated through the identification of salmon redds. Notes were also made at each site describing the nature of the in-channel and riparian habitat, and in particular, any factors likely to influence resident fish populations.

10.2.54 Data from the Invertebrate and River Habitat Survey (see paragraph 10.2.57 below) were used to augment data from these walkover surveys. Using these data and professional judgment, the fish species most likely to be present in the watercourse were identified.

Freshwater Habitats and Invertebrates

10.2.55 A freshwater survey was undertaken to assess the general aquatic ecological health of watercourses potentially affected by the proposed scheme. Physical parameters such as discharge and the size of catchment area were used to enable efficient targeting of sampling effort and assist in the interpretation of survey data.

10.2.56 Watercourses were sampled for simple *in-situ* physico-chemical parameters and aquatic macro-invertebrates following standard methods outlined by Wright et al. (1984). These samples were preserved and identified to species where possible using published keys. Diversity indices including Biological Monitoring Working Party (BMWP) (ISO-BMWP, 1979) and Average Score Per Taxon (ASPT) values were calculated to provide a measure of the ecological status of each watercourse.

10.2.57 An accredited surveyor undertook River Habitat Survey (RHS) in accordance with Environment Agency (EA) (2003) guidelines in summer 2004. RHS data were used to calculate a Habitat Modification Score (HMS). The assessment of the nature conservation value of each watercourse was based on water quality, macro-invertebrate community and habitat modification. A RHS was not undertaken for watercourses that were modified to such an extent that they were considered by default to be severely modified.

Assessment of Ecology and Nature Conservation Value (Baseline Evaluation)

10.2.58 The method for assessing the value of an ecological receptor uses all information collated in determining the baseline status of the resource. The ecological evaluation of a receptor is determined by reference to any designations, the results of consultations, a literature review and field surveys. The evaluation method incorporates a geographical framework where ecological receptors are assessed according to a series of criteria that are presented in Table 10.2. These criteria are based on the Ratcliffe Criteria (Ratcliffe, 1977) used in the selection of biological SSSIs and include size (extent), naturalness, rarity, typicality, vulnerability and position in an ecological/geographical unit.

10.2.59 The criteria used in the ecological evaluation process include reference to the legal protection conferred on species or habitats as well as the conservation status of the receptor, such as presence on national or local BAPs. These factors enable a level of conservation importance to be assigned to species/habitats that reflects the geographical framework used in the evaluation process. Thus, for example, species such as otters and bats, which are protected by international legislation, are referred to as internationally important in terms of their conservation status. Other species, such as wych elm, which are identified as priority species in the NES LBAP are referred to as regionally important species.

10.2.60 The ecological evaluation of a feature or area of habitat takes into account: the level of conservation importance of the species, other factors such as the level of use of the habitat or feature by a species, whether the species or habitat is locally or regionally common or rare, as well as other criteria that contribute to a feature's importance. In this way, the method of evaluation provides a system that combines legislative protection on species and/or habitats and conservation parameters that all contribute to the ecological importance of the receptor.

10.2.61 Terrestrial Habitat Areas (as defined by the Phase 1 Habitat Survey in Appendix A10.1) and Freshwater Habitat Areas (as defined by the Freshwater Report A10.16) were used to provide a spatial framework for the assessments. In each Habitat Area, records of the species and the habitats or features used by individual species were considered to provide an overall assessment of ecological value. For all habitats and for species with home ranges that correspond with the Habitat Areas, an ecological evaluation was made per Habitat Area. For species where the home ranges cover larger areas than the Habitat Areas (e.g. badgers and otters), the ecological evaluation was made for sub-sections of the Northern Leg that represent a spatial resolution appropriate to these species.

10.2.62 The status of bird species was also used to assist in their evaluation. The JNCC categorises 247 species in the UK as either Red listed (population in severe decline), Amber listed (populations in moderate decline or previously in severe decline, but are recovering), or Green listed (no identified threat to their populations).

10.2.63 Evaluation criteria used to evaluate sensitivity/importance are provided in Table 10.2.

Table 10.2 - Evaluation of Ecological Receptor

Value/ Importance	Criteria
International (European)	Habitats An internationally designated site or candidate site (Special Protection Area (SPA), provisional SPA, Special Areas of Conservation (SAC), candidate SAC, Ramsar Site, Biogenetic/Biosphere Reserve, World Heritage Site) or an area that would meet the published selection criteria for designation. A viable area of a habitat type listed in Annex I of the Habitats Directive, or smaller areas of such habitat, which are essential to maintain the viability of a larger whole. Any river classified as excellent A1 and likely to support a substantial salmonid population. Any river with a Habitat Modification Score indicating that it is Pristine or Semi-Natural or Obviously Modified. Species Any regularly occurring population of internationally important species, threatened or rare in the UK (i.e. a UK Red Data Book species categories 1& 2 of UK BAP) or of uncertain conservation status or of global conservation concern in the UK BAP. A regularly occurring, nationally significant population/number of an internationally important species.
National (Scottish)	Habitats A nationally designated site (Site of Special Scientific Interest (SSSI), National Nature Reserve (NNR), Marine Nature Reserve (MNR)) or a discrete area, which would meet the published selection criteria for national designation (e.g. SSSI selection guidelines). A viable area of a priority habitat identified in the UK BAP, or of smaller areas of such habitat essential to maintain wider viability. Any river classified as excellent A1 and likely to support a substantial salmonid population. Any river with a Habitat Modification Score indicating that it is Pristine or Semi-Natural or Obviously Modified. Species A regularly occurring, regionally or county significant population/number of an internationally/nationally important species. Any regularly occurring population of a nationally important species, threatened or rare in the region or county (see local BAP). A feature identified as of critical importance in the UK BAP.
Regional (North East Scotland)	Habitats Sites that exceed the County-level designations, but fall short of SSSI selection criteria. Viable areas of key habitat identified in the Regional Biodiversity Action Plan (BAP) or smaller areas of habitat essential to maintain wider viability. Viable areas of key habitat identified as of Regional value in the appropriate SNH Natural Heritage Future Area Profile. Any river classified as excellent A1 or good A2 and capable of supporting salmonid population. Any river with a Habitat Modification Score indicating that it is significantly modified or above. Species Any regularly occurring, locally significant population of a species listed as being nationally scarce, which occurs in 16 of 100 10 km^2 squares in the UK or in a Regional BAP or relevant SNH Natural Heritage Future area on account of its regional rarity or localisation. A regularly occurring, locally significant population/number of a regionally important species. Sites maintaining populations of internationally/nationally important species that are not threatened or rare in the region or county.
Authority Area (e.g. County or District) Aberdeenshire/City of Aberdeen	Habitats Sites recognised by local authorities, e.g. District Wildlife Sites (DWS) and Sites of Interest for Natural Science (SINS). County/District sites that the designating authority has determined meet the published ecological selection criteria for designation, including Local Nature Reserves (LNR). A viable area of habitat identified in County/District BAP or in the relevant SNH Natural Heritage Future Area Profile. A diverse and/or ecologically valuable hedgerow network. Semi-natural ancient woodland greater than 0.25 ha. Any river classified as good A2 or fair B and likely to support coarse fishery. Any river with a Habitat Modification Score indicating that it is significantly modified or above. Species Any regularly occurring, locally significant population of a species listed in a County/District BAP due to regional rarity or localisation. A regularly occurring, locally significant population of a County/District important species. Sites supporting populations of internationally/nationally/regionally important species that are not threatened or rare in the region or county, and not integral to maintaining those populations. Sites/features scarce in the County/District or that appreciably enrich the County/District habitat resource.
Local (immediate local area or village importance)	Habitats Areas of habitat that appreciably enrich the local habitat resource (e.g. species-rich hedgerows, ponds etc). Sites that retain other elements of semi-natural vegetation that due to their size, quality or the wide distribution within the local area are not considered for the above classifications. Semi-natural ancient woodland smaller than 0.25 ha. Any river classified as fair B or poor C and unlikely to support coarse fishery. River with a Habitat Modification Score indicating that it is severely modified or above. Species Populations/assemblages of species that appreciable enrich the biodiversity resource within the local context. Sites supporting populations of county/district important species that are not threatened or rare in the region or county, and are not integral to maintaining those populations.
Less than Local (limited ecological importance)	Sites that retain habitats and/or species of limited ecological importance due to their size, species composition or other factors. Any river classified as impoverished D and/or with a Habitat Modification Score indicating that it is severely modified.

Impact Assessment

10.2.64 As described in Chapter 5 (Overview of Assessment Process), impact significance was determined with respect to the sensitivity/importance of the baseline conditions and the magnitude of potential impact. This is described in detail below.

Impact Magnitude

10.2.65 Methods of impact prediction used included direct measurements, correlations, expert opinion and information from previous developments. Impacts include those that are predicted to be direct, indirect, temporary, permanent, cumulative, reversible or irreversible. The magnitude of each impact was assessed independently of its value or statutory status.

10.2.66 Magnitude criteria are presented in Table 10.3 and include positive impact criteria in accordance with IEEM guidance (2002).

Table 10.3 - Definition of Ecological Impact Magnitude

Impact Magnitude	Criteria
High negative	The change is likely to permanently, adversely affect the integrity of an ecological receptor, in terms of the coherence of its ecological structure and function, across its whole area that enables it to sustain the habitat, complex of habitats and/or the population levels of species of interest.
Medium negative	The change is not likely to permanently, adversely affect the integrity of an ecological receptor, but the effect is likely to be substantial in terms of its ecological structure and function and may be significant in terms of its ecological objectives. Likely to result in changes in the localised or temporary distribution of species assemblage or populations, but not affect the population status at a regional scale or permanently.
Low negative	The change may adversely affect the ecological receptor, but there will probably be no permanent effect on its integrity and/or key attributes and is unlikely to be significant in terms of its ecological objectives. Impacts are unlikely to result in changes to the species assemblage or populations, but core species more vulnerable to future impacts.
Negligible	The change may slightly adversely affect the receptor, but will have no permanent effect on the integrity of the receptor or its key attributes. There are no predicted measurable changes to the species assemblage or population and the effect is unlikely to result in an increased vulnerability of the receptor to future impacts.
Positive	The change is likely to benefit the ecological receptor, and/or enhance the biodiversity resource of the receptor.
High positive	The change is likely to restore an ecological receptor to favourable conservation status, contribute to meeting BAP objectives (local and national) and/or create a feature that is of recognisable value for biodiversity.

Impact Significance

10.2.67 The significance of impacts was then determined according to the matrix of value/sensitivity and magnitude as illustrated in Table 10.4.

Table 10.4 - Ecological Impact Significance

Value/ Sensitivity	Magnitude					
	High Negative	Medium Negative	Low Negative	Negligible	Positive	High Positive
International	Major	Major	Moderate	Negligible	Moderate	Major
National	Major	Major	Moderate	Negligible	Moderate	Major
Regional	Major	Moderate	Minor	Negligible	Minor	Moderate
Authority Area	Moderate	Moderate	Minor	Negligible	Minor	Moderate
Local	Minor	Minor	Minor	Negligible	Minor	Minor
Less than Local	Minor	Negligible	Negligible	Negligible	Negligible	Negligible

Limitations to Assessment

10.2.68 Any limitations to surveys undertaken are reported in the relevant Appendices A10.1 to A10.16.

10.3 Baseline Conditions

10.3.1 Due to the complexity of assessing the wide range of species and habitats present, the description of baseline conditions in this section is reported separately to their evaluation.

10.3.2 The results of consultation, literature review and field survey are provided below. More detailed information, obtained through the literature review process, including species characteristics and habitat requirements, is provided in the relevant technical appendices (A10.1 to A10.16).

Terrestrial Habitats

Consultation and Literature Review

10.3.3 SNH provided records of ancient and long-established woodlands from their Semi-natural and Ancient Woodland Inventories, and peatlands listed in the Lowland Raised Bog Inventory (LRBI).

10.3.4 Aberdeen City Council provided details of statutory and non-statutory designated sites of ecological importance including SSSI, DWS and a list of NES LBAP priority habitats. The NES LBAP Coordinator confirmed locally important species and priority habitats.

10.3.5 The NESBReC provided Phase 1 Habitat Survey results undertaken by the SWT (1992 to 1997, and 2002), a plan showing DWS and the results of the Grampian Natural Habitat Survey (1988).

10.3.6 The Forestry Commission provided information regarding forest/woodland areas and their management.

Designated Areas

10.3.7 Corby, Lily and Bishop Lochs form a composite SSSI that is designated for the habitats it supports, which include wet heath, marshy grassland, open water and basin mire habitats. The SSSI citation also refers to the importance of the waterbodies as a wintering site for wintering wild fowl.

10.3.8 Locally designated sites include Brimmond Hill DWS and SINS, Gough Burn DWS, Farburn Wood DWS, the River Don DWS, Newton of Shielhill DWS, Den of Moss-side DWS and the Formartine and Buchan Way DWS; these areas are presented in Figures 10.1a-d and are discussed in further detail in the Terrestrial Habitats section and Appendix A10.1.

10.3.9 Habitat types include boundary and linear features, arable and horticultural land, improved grassland, fen, marsh and swamp, coniferous woodland and broad-leaved, mixed (and yew) woodlands.

10.3.10 Several priority UK BAP habitats are present in the study area, including lowland heath, lowland raised bog, cereal field margins, lowland meadows, wood-pasture and parkland, and wet woodland. The NES Biodiversity Audit identified that Aberdeenshire holds 44 listed habitats. The habitats are well represented in NE Scotland in a UK or Scottish context. Those of relevance to the study area are planted coniferous woodlands, acid grassland, lowland raised bogs and fens. In addition, six locally important habitats were identified; of these, four are relevant to the study area, scrub, riparian woodland, birch woodlands and serpentine grassland/heath mosaic. Birch woodlands and serpentine grassland/heath mosaic are considered to be of national significance.

10.3.11 The NES Biodiversity Audit identified that Aberdeenshire holds approximately 309 listed species. UK BAP and NES LBAP Priority species include the red squirrel, otter, freshwater pearl mussel, river and brook lamprey, and water vole. Several bird species also are national and local priority

species, including the bullfinch (*Pyrrhula pyrrhula*), linnet (*Perdix perdix*), song thrush (*Turdus philomelos*), and skylark (*Alauda arvensis*). A NES LBAP stonefly (*Brachyptera putata*) was also recorded by SEPA during routine monitoring of the River Don between 1980 and 2003.

10.3.12 Additional NES LBAP Priority and locally important species include Daubenton's bat (*Myotis daubentonii*), wych elm (*Ulmus glabra*), kingfisher (*Alcedo atthis*), goldeneye (*Bucephala clangula*), and yellowhammer (*Emberiza citronella*).

Field Survey

10.3.13 The results of the Phase 1 Habitat survey and target note numbers are presented in Figures 10.2a-g and are detailed in Appendix A10.1. On the basis of these results, further boundaries were drawn to form Habitat Areas. Results have been described using these Habitat Areas, which are referred to as N1 to N97. The following paragraphs briefly describe the main habitats found along the route corridor, with Habitat Area numbers given in parentheses, and shown on Figures 10.3a-g. The description is from south to north following the route corridor and reported in the five route sections (referenced by chainage) for clarity. A summary of all Habitat Areas is presented in Table 10.5.

Section NL1

10.3.14 Land use is predominantly agricultural and the corridor crosses a matrix of fields, often with characteristic dry stone walls, and occasional shelterbelts, woodland blocks and scattered trees, but few areas of semi-natural vegetation.

10.3.15 To the south of the start of the Northern Leg, large predominantly arable fields occur at Fairley Home Farm and Derbeth Farm on south-facing lower slopes of Brimmond Hill. Field boundaries include shelterbelts of mostly young to semi-mature coniferous plantations (N4). A small waterbody has been created in the corner of one field, surrounded by willow carr and scrub (N2). Locations of farms referred to are shown in Chapter 7 (Land Use) in Figures 7.1a-g.

10.3.16 Woodlands at Fairley Home Farm and Derbeth Farm include young to mature coniferous, mixed and broad-leaved woodland (N7). North of Fairley Home Farm, the broad-leaved woodland is semi-natural, with a species-rich ground flora (N3). At Derbeth, the broad-leaved woodland includes local areas of wet alder and willow woodland around a waterbody and drainage channel (N6).

10.3.17 Sheep-grazed fields with patches of acid grassland characterise the lower slopes of Brimmond Hill (DWS, SINS). The unmanaged lower to mid slopes have areas of dense gorse scrub with bracken. Occasional scattered trees, including naturally regenerating birch, rowan and ash, are present in the scrub (N8). The upper slopes support dry heath vegetation dominated by heather (*Calluna vulgaris*) with occasional, small patches of acid grassland on the thin acidic soils (N9).

10.3.18 Agricultural land on higher ground between Brimmond Hill and the farms at Newton and Kepplestone comprises small irregularly shaped fields of grazed improved and semi-improved grassland. Field boundaries form a network of dry stone walls with abundant stands of dense and scattered gorse scrub and frequent scattered trees. The area includes patches of dense gorse scrub and a small pond to the east (N11, N12, and N13).

10.3.19 A few small fragments of semi-natural woodland are present, including wet woodland with willow and alder carr and stands of dense and scattered scrub (gorse and willow). South of the Scottish Agricultural College (SAC) Craibstone campus, these areas of wet woodland form a mosaic with marshy grassland and patches of wet heath, mire and swamp vegetation along the Gough Burn DWS (N14). There are subsidiary burns and ditches supporting aquatic and marginal plant species and species-rich vegetation. To the west, Gough Burn flows through fields in a gully lined with dense gorse scrub (N18).

Section NL2

10.3.20 The SAC Craibstone campus has a mosaic of woodland blocks and improved grassland fields (N25, N26, and N28). There are areas of conifer, mixed and broad-leaved woodland plantation,

including an arboretum containing mature, exotic tree species, and areas of mature beech woodland. Four small streams flow through these woodland habitats: Gough Burn, an unnamed burn, Craibstone Burn and Green Burn. The mature woodland supports a species-rich ground flora, particularly along Craibstone and Gough Burns (N24). Scrub and bracken patches, and Craibstone Pond, which has abundant aquatic and marginal plant species with willow scrub and wet woodland, contribute to the rich diversity of the area (N28). To the west of the C88c road, there is an experimental area with a series of fenced trial plots of young broad-leaved woodland.

Section NL3

10.3.21 North of the A96, the land is used predominantly for agriculture and forestry. Most of the farmland is intensively managed, but there are local areas with semi-improved or unimproved grassland such as at the derelict farm at Balgosie. Here species-rich field margins and verges occur along farm tracks, and small meadows support semi-improved grassland communities (N33). Farmland east of Kirkhill Forest has field boundaries of gorse scrub along dry stone walls.

10.3.22 Large agricultural fields (mainly in arable crop) lie between the A96 and Dyce Industrial Estate (N30). The route then passes through an area of mixed farming that rises westwards to the conifer plantations at Kirkhill Forest. Kirkhill Forest extends to the west and north of the study area and is owned and managed by the Forestry Commission. It includes blocks of conifer plantation ranging from nursery stock and saplings, Christmas tree nurseries at Bogenjoss, to mature pine, larch and spruce (N34 and N37). The area includes acid grassland and heathland vegetation, and is used for recreation with numerous tracks and cycle paths. The northern part of Kirkhill Forest includes open habitats such as acid grassland and scrub, and marshy grassland.

10.3.23 Standingstones Wood (N35) occupies the lower slopes on the east side of Kirkhill Forest and comprises recently planted blocks, and areas of dense gorse, dry heath, tall herb and broad-leaved woodland plantation. Other commercial conifer woodlands include East Woodlands to the north of Kirkhill, connected to Kirkhill by a small area of mature beech woodland (N43), and Lower Overton Forest, which comprises semi-mature spruce and extends to the east of the study area (N40). Most of the forests here have young trees and no felling is currently planned (Forestry Commission, 2005).

10.3.24 Landscape features include mature broad-leaved trees and lines of trees, for example around Standingstones Farm, and at the Stone Circle in East Woodlands (N39). East of Standingstones Wood is Farburn Wood DWS, which is a small semi-natural wood with wet and riparian habitat (N36).

10.3.25 Bogenjoss Burn flows in an easterly direction through Kirkhill Forest and then northwards towards Pitmedden House (N42 and N45). The valley of the burn supports a mosaic of various semi-natural habitats, including marshy grassland, scrub, bracken and naturally regenerating broad-leaved woodland, forming an important ecological corridor linking the large commercial forest areas with woodland surrounding Pitmedden House. Other semi-natural woodland is infrequent, and limited to naturally regenerating woodland habitat in a small area of Overton Wood in the south of the study area.

10.3.26 Monument Wood is a commercial plantation (N47) with semi-mature larch and a small open area, of mature pine forest with semi-natural characteristics. Approximately 50% of this woodland was felled in 2004-2005. Other small areas of mature pine and mixed plantation wood occur adjacent to Pitmedden House and there are two areas of recent plantation to the east of Monument Wood.

10.3.27 Some local areas have semi-improved or unimproved grassland, including acid grassland to the southeast of Bogenjoss Burn, roadside verges north of the airport and near a large sand and gravel quarry, north of Upper Kirkton to the north of the railway line (N49). The quarry has bare ground with occasional waterbodies, and patches of scrub and tall herb vegetation. East of the quarry, there is an area of marshy grassland (Moss Fetach) on the edge of the flood plain of the River Don (N51). Patches of dense and scattered scrub occur, including gorse scrub in and around the sand and gravel quarry and stands of bracken around the edges of woodlands.

Section NL4

10.3.28 This is the most complex part of the Northern Leg. The proposed scheme would cross the River Don, several roads and other existing features of interest (such as Goval Mill Lade). After crossing the River Don, the route crosses the B977 and A947 at Goval, and the B997 and B977 (again) at Littlejohn's Wood. It also crosses the Formartine and Buchan Way, a disused railway that is now used as a long distance cycle and footpath. The route includes a junction with the A947 and a new Section that rejoins the existing A947 near Goval Belt.

10.3.29 Land use is predominantly agricultural (e.g. N54 and N55). Most of the farmland is intensively managed, with fields of improved grassland for cattle grazing or silage, and some arable land. Agricultural fields on southwest bank of the River Don are used for sheep and horse grazing (N51).

10.3.30 The River Don is a DWS and supports species-rich grassland habitats along both banks often forming mosaics with tall herbaceous vegetation and scattered scrub (N52). The Formartine and Buchan Way has species-rich grassland on its embankments and cuttings with scattered areas of scrub and occasional mature trees (N62). Other areas of semi-improved grassland are located in fields with less intensive agricultural management, such as those adjacent to Goval Burn. North of Meadow-head Burn and east of the Formartine and Buchan Way, arable and improved grassland fields have well-maintained dry stone walls along boundaries. The fields are connected by farm access tracks with species-rich verges in some areas and wayside trees and scrub.

10.3.31 Goval Burn flows in a southerly direction, entering the River Don upstream of the existing A947 Park Hill Bridge, which is due south (< 100m) of the Formartine and Buchan Way crossing. This small river has been modified and canalised in most sections, but has a more natural course where it flows alongside the Formartine and Buchan Way. The river has marginal vegetation, with trees and scrub on the banks. A small reservoir (the Lade) is the water source for a canal (approximately 1km long) that rejoins the burn downstream. The diversity of habitats is enhanced by the Mill Lade Aqueduct and Goval Burn, which both flow along field margins (N60 and N61).

10.3.32 At Derbeth, broad-leaved woodland plantations and shelterbelts include Goval Belt, east of Goval Wood, and areas of mature broad-leaved woodland at Corsehill, west of Littlejohn's Wood. Goval Belt is a shelterbelt (approximately 50m wide) of mature birch and rowan with other broad-leaved woodland tree species extending either side of the A947 (N58). Goval Wood has a mosaic of semi-natural habitats, dominated by birch woodland with areas of mature birch and rowan, and unimproved acid grassland (N56). In the south of the corridor, a belt of semi-mature even-aged beech woodland that is part of the Parkhill Estate (N63) extends to the south. Other small areas of mixed and broad-leaved woodland plantation are scattered throughout the section.

10.3.33 Semi-natural broad-leaved woodland includes areas that are likely to be of long established plantation origin with semi-natural characteristics including a diverse age structure and ground flora, such as on the east bank of the River Don around Goval House, in roadside woodland in the Park Hill estate, at Skate Wood and at Corsehill (N71), west of Littlejohn's Wood.

10.3.34 Mature commercial sitka spruce plantation blocks are present to the north of Goval Wood, at Littlejohn's Wood and in Den Wood, and smaller blocks are scattered elsewhere in the section. Littlejohn's Wood is mixed woodland (N72). The eastern half was mature coniferous plantation and felled in winter 2004-2005. In the northwest, previously felled woodland has regenerated naturally and now has a mosaic of young birch woodland and wet heath. North of the conifer block, mature broad-leaved woodland of long-established plantation origin forms a strip to the south of a large area of marshy grassland and connects to woodland at Red Moss (N74).

Section NL5

10.3.35 After crossing the B977, the proposed scheme would cross an unclassified road at Newtonhill Farm to the B999, and crosses the Blackdog Burn to join the A90 at Fifehill, north of Blackdog. Land use is dominated by intensive, mainly arable agriculture, with fields of improved grassland (e.g. N84, N86 and N87).

10.3.36 The lowland raised bog at Red Moss (Park Hill) is located on either side of the B977 (SNH LRBI). Both areas show evidence of past peat cutting, including terraced peat profiles, and are being encroached by birch (N83). The main habitats are wet modified bog with drier bog vegetation in the centre of the peat dome (N74, N75 and N82). Wet heath forms a mosaic with acid grassland on shallower peat. The bog habitats are considered to have restoration potential.

10.3.37 Corby and Lily Lochs are significant areas of open water forming part of the Corby, Lily and Bishop's Loch SSSI. Approximately 50% of the Corby and Lily Lochs area of the SSSI is located in the section (N85). Corby Loch is the larger of the two lochs and is used for fishing. Its west side is free of vegetation has a large sand and gravel quarry close to the shore (N81). The north and west shores are bounded by wet woodland, swamp vegetation and wet heath.

10.3.38 Lily Loch is smaller and surrounded by wet heath, mire and swamp. Mire habitat to the southwest of Lily Loch is dominated by bottle sedge and sphagnum species. The topography of the site characterises this as basin mire, with scattered scrub and tree saplings, but both the wet heath and mire communities have characteristics of upland blanket peat bog that are unusual in lowland Aberdeenshire. To the north of Corby and Lily Lochs, wet woodland is dominated by willow carr with alder and birch and marshy grassland fields that are particularly species-rich.

10.3.39 Newton of Shielhill DWS is a small waterbody used for fishing, with swamp and marginal vegetation and gorse scrub (N88).

10.3.40 There are few areas of commercial conifer plantation. Mature spruce plantations are present to the north of Red Moss (assumed to have been planted over former bog habitat) (N77) and there is a small block of mature pine northeast of Corby Loch. Other areas of mixed or broad-leaved woodland plantation form shelterbelts such as at Moss Belt, south of the B977 (N78).

10.3.41 Semi-natural broad-leaved woodland includes a large area of mature birch woodland at Red Moss, north of the B977, and naturally developing birch woodland and semi-natural areas of broad-leaved woodland to the south of Red Moss, between the B977 and Lochgreens Road.

10.3.42 A characteristic landscape feature is lines of mature trees of broad-leaved woodland species, in particular beech and sycamore. These may be relics of historic land boundaries, and/or shelterbelt plantations (N90).

10.3.43 Blackdog Burn flows in an east-south-east direction from Potterton to the north of the proposed scheme, crossing under the A90 at Blackdog. The burn is fast flowing, and has been modified in many parts. Either side of Blackdog Burn, are stands of dense gorse scrub with local patches of broad-leaved woodland plantation (N91, N94). Dense scattered scrub is found throughout this section along field margins and is invading bog habitats.

10.3.44 East of the B999, land use is predominantly agricultural, although at Blackdog there are industrial and residential areas. Southeast of Blackdog, there is a large landfill site, much of which has been capped and improved grassland has established. Many farmland fields have species-poor, semi-improved grassland around Blackdog. The fields have been left unmanaged allowing tall herbaceous plants and rank grasses to dominate (N97).

Table 10.5 - Terrestrial Habitat Summary

Feature / Site	Habitat Area	Phase 1 Description of Habitat Area
Section NL1		
Kingswells	N1	Semi-natural habitats within Kingswells including shelterbelt plantations and localised areas of marshy grassland. Den of Moss-side DWS is located just outside the study area.
Agricultural fields N of Clog Hill	N2	Extensive area of arable farmland, with shelterbelt woodlands.
Woodland at Fairley Home Farm and Derbeth Farm	N3	Series of shelterbelts and small woodland plantations in between farmland west of Kingswells with semi-natural woodland habitat present north of Fairley Home Farm.
Agricultural land at Fairley Home Farm and Derbeth Farm	N4	Large arable fields of limited ecological value.
Kingswells	N5	Semi-natural habitats including shelterbelt plantations and localised areas of marshy grassland.
Woodland W of Hillhead of Derbeth Farm	N6	Part of Brimmond Hill DWS and Sites of Interest to Natural Science (SINS), with a mosaic of coniferous plantation and semi-natural broad-leaved woodland, including localised areas of wet woodland.
Woodland and shelterbelt east of Hillhead of Derbeth Farm	N7	Mosaic of conifer and broad-leaved woodland plantation and a wide shelterbelt.
Scrub and bracken on lower slopes of Brimmond Hill	N8	Part of Brimmond Hill DWS and SINS. Area of gorse scrub with occasional scattered trees.
Dry heath on upper slopes of Brimmond Hill	N9	Part of Brimmond Hill DWS and SINS. Area of dry heath on thin acidic soils on upper slopes and summit of Brimmond Hill. An important area of lowland heath (<300m altitude) in the region of NE Scotland. Lowland heath is a UK Biodiversity Action Plan (UK BAP) priority habitat. The area is identified in the SNH NE Coastal Plain Natural Heritage Futures (NHF) Initiative as being a remnant of formerly extensive cover of lowland heath across much of the area.
Agricultural fields south of C89c and Overhills Farm	N10	Arable and improved grassland fields with dry stone walls.
Agricultural fields N of C89c and E of Brimmond Hill	N11	Large area of small fields of improved grassland with a network of intact dry stone walls and abundant scrub and scattered trees.
Agricultural fields surrounding Kepplestone Farm	N12	Farmland with predominantly improved grassland and dry stone walls and occasional scattered gorse scrub.
Agricultural fields between Brimmond Hill and Kepplestone	N13	Farmland with improved grassland and an area of dense gorse scrub to east of Brimmond Hill and a small pond.
Gough Burn	N14	DWS and SINS. Mosaic of semi-natural habitats including marshy grassland, wet heath/mire, swamp, wet woodland and scrub. Wet woodland is a UK BAP priority habitat. This Habitat Area also comprises several viable areas of habitats prioritised in the NE Scotland Local Biodiversity Action Plan (NES LBAP).
Agricultural fields between Gough Burn and Newhills Wood	N15	Series of large fields, of limited ecological value.
Newhills Wood	N16	Commercial coniferous plantation that enhances the local habitat resource.
Agricultural fields and cemetery at Newhills	N17	Farmland with predominantly arable fields and amenity planting associated with Newhills Cemetery.
Section NL2		
Agricultural fields between Gough Burn and Golf course	N18	Farmland with improved grassland and riparian habitats adjacent to Gough Burn
Craibstone Golf course	N19	Extensive area of mown grassland with scattered tree saplings.
Agricultural fields between Newhills Wood and	N20	Relatively small Habitat Area with farmland.

Feature / Site	Habitat Area	Phase 1 Description of Habitat Area
Craibstone		
Parkhead Wood	N21	Small block of mature conifer plantation.
West Woods	N22	Extensive area of commercial conifer plantation, most of which is located west of the study area.
Woodland/Farmland W of C88c, N of Parkhead Wood	N23	Mosaic of farmland and small blocks of plantation woodland.
Woodland along Gough Burn	N24	Semi-mature mixed plantation and semi-natural broad-leaved woodland. Part of an area of semi-natural woodland within the Scottish Agricultural College (SAC) campus that represents a viable area of NES LBAP priority habitat.
Woodland in W of SAC Craibstone campus	N25	Two areas with semi-mature mixed plantation and semi-natural broad-leaved woodland. Forms part of semi-natural woodland within the SAC Craibstone campus that represents a viable area of NES LBAP priority habitat.
Woodland along Craibstone Burn	N26	Two areas with semi-mature mixed plantation and semi-natural broad-leaved woodland. Forms part of semi-natural woodland within the SAC Craibstone campus that represents a viable area of NES LBAP priority habitat.
Woodland along Green Burn	N27	Relatively small area of semi-mature mixed plantation woodland that is of less ecological value than other woodland areas.
Agricultural land in SAC Craibstone campus E of C88c	N28	Farmland within the SAC Craibstone campus.
Section NL3		
Agricultural land NE of Dyce Drive	N29	Relatively small area of farmland.
Agricultural land between A96 and Dyce Drive	N30	Extensive area of farmland with large fields.
Chapelbrae Wood	N31	Small area of semi-mature broad-leaved woodland plantation.
Agricultural land between Newton and Upper Corsehill	N32	Large area of farmland with arable, improved and semi-improved grassland, dry stone walls, scattered scrub and species-rich grass verges. The habitats towards Upper Corsehill are a particularly important network of dry stone walls and species-rich grassland.
Agricultural land S of Standingstones Wood and E of Kirkhill Forest	N33	Farmland that includes large arable fields on lower ground to the east and less intensively managed fields on higher ground to the west of the study area. In these areas, there are species-rich hay meadows with species rich verges along tracks and dry stone walls.
Kirkhill Forest South	N34	Extensive area of young to mature coniferous plantation that extends further west and north. Diverse range of semi-natural habitats, including localised areas of broad-leaved woodland, scrub, wet heath and grassland.
Standingstones Wood	N35	Area of Kirkhill Forest that extends downhill almost as far as Farburn Wood, comprising blocks of young spruce and larch. A dry valley extends along the south edge and supports a mosaic of habitats including dry heath, bracken, scrub and tall herb vegetation. This mosaic of habitats has connectivity with Kirkhill Forest to the west.
Farburn Wood DWS	N36	DWS. Relatively small area of mature broad-leaved woodland, probably of long-established plantation origin, but with semi-natural characteristics.
Kirkhill Forest North	N37	Extensive area of commercial forest plantation with localised areas of semi-natural habitats such as marshy grassland, acid grassland and scrub habitats.
Habitats along Bogenjoss Burn within Kirkhill Forest.	N38	Mosaic of open semi-natural habitats along the course of Bogenjoss Burn including acid grassland, scrub and marshy grassland.
Agricultural fields around Standingstones Farm	N39	Farmland comprising arable and improved grassland with well-maintained dry stone walls, and localised areas of scrub and woodland.
Lower Overton Wood	N40	Commercial conifer plantation with localised areas of mixed woodland plantation and naturally developing young broad-leaved woodland.
Agricultural fields between Lower Overton Wood and	N41	Farmland between forest areas comprising small fields with improved grassland and localised areas of unimproved acid grassland

Feature / Site	Habitat Area	Phase 1 Description of Habitat Area
East Woodlands		on steep valley sides.
Bogenjoss Burn downstream of Kirkhill Forest.	N42	Linear series of habitats along the course of the burn including marshy grassland, scrub and semi-natural, riparian broad-leaved woodland along the valley bottom that forms a viable area of priority NES LBAP habitat.
East Woodlands	N43	Area of conifer plantation, with open habitats, broad-leaved woodland plantation and a line of mature beech trees along a former land boundary. These habitats include areas of priority NES LBAP habitat.
Agricultural fields W of Bogenjoss Burn	N44	Farmland comprising large arable and improved grassland fields of limited ecological value.
Woodland at Bogenjoss Burn and Pitmedden House grounds	N45	Semi-natural riparian broad-leaved woodland and mixed and conifer plantation. Includes viable areas of NES LBAP priority riparian woodland, and small areas of parkland with wood and ornamental gardens.
Agricultural fields SE of Bogenjoss Burn	N46	Farmland with predominantly grazing and silage fields with occasional areas of scrub and mature trees. This area includes a large field of semi-improved acid grassland.
Monument Wood	N47	Commercial conifer woodland with a small area of mature semi-natural pinewood of long-established plantation origin.
Agricultural fields between Monument Wood and Lower Overton Wood	N48	Farmland with improved grassland fields, well-maintained walls and localised areas of less intensive grassland and scrub at West Overton.
Section NL4		
Agricultural fields and Quarry north of railway line	N49	Farmland north of the Formantine to Buchan Way (DWS)
Agricultural fields to sides of Dyce Drive, S of railway	N50	Extensive area of farmland with improved grassland and arable fields and localised areas with small blocks of broad-leaved woodland plantation, occasional standard trees and gorse scrub.
Agricultural fields on SW bank of River Don valley	N51	Farmland with improved grassland and an area of marshy grassland (Moss Fetach) at the edge of the flood plain.
Banks of the River Don	N52	DWS. Riparian habitats on banks of River Don with additional important in-channel freshwater habitats. Banks support species-rich grassland, scattered scrub and tall herb habitats. The semi-natural habitats represent viable areas of priority habitats identified in NES LBAP.
Woodland around Goval House	N53	Mature broad-leaved woodland of long-established plantation origin.
Farmland between River Don and B977	N54	Farmland, large arable fields and improved grassland pasture with scattered scrub and shelterbelts of mature mixed plantation.
Agricultural fields surrounding Goval Farm	N55	Farmland comprising arable and improved grassland fields with well-maintained dry stone walls and scattered scrub.
Goval Wood	N56	Mosaic of semi-natural habitats, dominated by birch woodland with areas of priority NES LBAP habitats including wet woodland, unimproved acid grassland, and wet heath habitats.
Plantation N of Goval Wood	N57	Semi-mature commercial coniferous plantation.
Goval Belt	N58	Relatively wide shelterbelt of broad-leaved woodland, dominated by mature birch and rowan with records of wych elm. This habitat area forms an important ecological link between Goval Burn and Goval Wood and supports woodland.
Agricultural fields N of Goval Belt	N59	Farmland, with improved grassland.
Agricultural fields S of Goval Belt, between A947 and Formartine and Buchan Way	N60	Small area of farmland with arable and silage fields and increased habitat diversity due to the Mill Lade Aqueduct and Goval Burn, which both flow along field margins.
Goval Burn and Lade	N61	River and reservoir with marginal habitats and wayside trees, and diverse mosaic of habitats: tall herb, grassland, scrub, woodland and semi-improved pasture.
Formartine and Buchan Way	N62	The Formartine and Buchan way supports species-rich grassland along its embankments and cuttings with scattered areas of scrub and occasional mature trees.
Park Hill Estate	N63	Semi-natural broad-leaved woodland and mature beech plantation of long-established plantation origin, amongst cattle-grazed improved grassland. This area is a small proportion of a much larger area that includes the NES LBAP priority habitat, parkland and

Feature / Site	Habitat Area	Phase 1 Description of Habitat Area
		wood pasture, with records of wych elm.
Agricultural fields SE of Formartine and Buchan Way	N64	Relatively small area of farmland with arable and improved grassland fields.
Skate Wood	N65	Mature birch and rowan woodland with semi-natural characteristics such as widespread natural regeneration and woodland ground flora. This woodland is listed as an Important Local wildlife Site under the Scottish Wildlife Action Project.
Roadside plantation and mature pine avenue at Little Goval	N66	Mixed plantation between farm access road and the B977 and an adjacent avenue of mature pine trees forming a shelterbelt either side of the farm access road.
Den Wood and roadside plantations	N67	Commercial conifer plantation with mature and young blocks.
Agricultural fields between B977 and Meadowhead Burn	N68	Extensive area of farmland with predominantly improved grassland, well-maintained dry stone walls and occasional trees and scrub.
Agricultural fields N of Meadowhead Burn and E of Formartine and Buchan Way	N69	Extensive area of farmland with arable and improved grassland and well-maintained dry stone walls. Farm access tracks support localised species-rich verges and have numerous wayside trees and scrub.
Agricultural fields E of B997 at Newpark Steading	N70	Extensive area of farmland with improved grassland, marshy grassland and modified burn channels.
Meadowhead Burn	N73	Farmland with marshy grassland and occasional arable fields, and occasional small blocks of conifer and mixed plantation.
Section NL5		
Corsehill Wood	N71	Relatively small area of plantation and semi-natural broad-leaved woodland that is connected to woodland habitats at Den Wood to the south and Littlejohn's Wood to the northeast.
Littlejohn's Wood	N72	Woodland comprising mostly conifer plantation with naturally regenerated birch woodland in the northwest and boundary features of mature beech trees. Important ecological links to Red Moss and Corsehill Wood.
Woodland at Red Moss, N of B977	N74	Mature semi-natural broad-leaved woodland dominated by birch and rowan with localised areas of wet woodland, wet heath and acid grassland. Habitat diversity, size and connectivity with Littlejohn's Wood and Red Moss.
Raised bog at Red Moss, N of B977	N75	Lowland raised bog habitats comprised of wet modified bog with a central dome supporting drier peat bog vegetation. Although modified, these habitats retain features of intact bogs that are priority habitats in the UK BAP. Red Moss forms part of an important network of similar sites throughout NE Scotland.
Farmland and bare ground at Moss-side, N of B977	N76	Series of small fields of improved grassland.
Plantation NE of Red moss, N of B977	N77	Semi-mature commercial spruce forest that extends to the northeast of Red Moss
Mosaic of scrub and grassland W of Moss Belt	N78	Mosaic of semi-natural habitats, with mature boundary-feature beech trees along the roadside, wet heath, acid grassland and scattered and dense gorse scrub habitat.
Moss Belt Plantation	N79	Shelterbelt comprising mature mixed plantation.
Agricultural fields between B977 and Loch Hills Quarry	N80	Large arable fields with dry stone walls and several fields with species-poor semi-improved grassland, with areas of scattered scrub. Two small ponds surrounded by marshy grassland and scrub habitat.
Loch Hills Quarry	N81	Gravel and sand quarry, with areas of bare ground, and localised areas of scrub and sparse vegetation.
Red Moss, S of B977	N82	Extensive area of lowland raised bog, functionally connected to Red Moss, N of B977 (N75). Mainly wet modified bog habitats with a small area of drier habitat north of the site. Scrub and woodland encroachment occurring at edge of the bog, with evidence of drainage and cutting, particularly along the south.. However, bog retains a raised dome structure and forms part of an important network of similar sites throughout NE Scotland.
Woodland between Red Moss and Lochgreens Farm	N83	Semi-natural broad-leaved woodland on south side of Red Moss (N82) and encroaching into bog habitats. The woodland supports a semi-natural ground flora.
Agricultural fields S of Lochgreens Farm	N84	Farmland with large arable fields, and improved and marshy grassland fields, including a small copse of mature beech around a

Feature / Site	Habitat Area	Phase 1 Description of Habitat Area
		walled area of acid grassland.
Corby and Lily Lochs and associated habitats	N85	SSSI, DWS and SINS. It includes a diverse range of habitats that includes open water, swamp, basin mire (poor-fen vegetation), wet heath, wet woodland, scrub and drainage channels.
Agricultural fields between Red Moss and Newtonhill Farm	N86	Extensive area of farmland with large fields of species-poor hay meadows and grazing pasture.
Agricultural fields between Lochgreens Road and Gravel Pit	N87	Extensive area of farmland with predominantly improved grassland and two arable fields, with localised semi-natural habitats.
Newton of Shielhill DWS	N88	DWS. A small Habitat Area comprising a small waterbody supporting swamp and marginal vegetation, with localised areas of gorse scrub. A recent broad-leaved woodland plantation is located along the roadside at Newtonhill.
Agricultural fields between unclassified road and B999 (N)	N89	Farmland with predominantly arable fields with dry stone walls and an extensive, recently-planted conifer plantation woodland. It also includes a series of small ponds and marshy grassland.
Agricultural fields between unclassified road and B999 (S)	N90	Farmland comprising arable fields and improved grassland, and mature sycamore trees that form boundary features.
Agricultural fields adjacent to Blackdog Burn, E of B999	N91	Farmland that comprise predominantly improved grassland with stands of dense gorse scrub and localised patches of broad-leaved woodland plantation.
Agricultural fields between B999 and Harehill Farm	N92	Farmland comprising arable fields, with occasional mature trees and dry stone walls and gorse.
Agricultural fields between Harehill Farm and A90, S of Blackdog Burn	N93	Farmland with improved grassland, well-maintained network of dry stone walls, and a series of semi-mature and young conifer and mixed plantation woodland blocks.
Agricultural fields west of A90, N of Blackdog Burn	N94	Farmland comprised of arable fields, with scattered gorse scrub and bracken.
Grassland east of A90, S of Blackdog	N95	Open improved grassland with a revegetated area of landfill. Young, recently-planted conifer plantations are present south of residential areas in Blackdog.
Agricultural fields, W of A90, either side of Potterton Road	N96	Farmland comprising arable and improved grassland fields with localised areas of dense gorse scrub, semi-improved grassland, and young broad-leaved woodland plantation.
Agricultural fields E of A90, N of Blackdog	N97	Farmland, comprising arable and improved grassland fields, with localised areas of unmanaged grassland with scattered ruderal and tall herb vegetation and a young conifer plantation.

Badger

10.3.45 Badgers (*Meles meles*) and their setts are legally protected by the Protection of Badgers Act (1992), the Nature Conservation (Scotland) Act (2004) and through inclusion in Schedule 6 of the WCA (1981). Through these Acts they are legally protected from intentional or reckless cruelty, such as badger-baiting and from the results of lawful human activities, such as housing, road or other developments. Badgers are afforded protection from wilful or attempted killing, injuring and from interference with a badger's sett.

Consultation and Literature Review

10.3.46 Badger sett and road traffic accident (RTA) locations within the study corridor were supplied by Grampian Badger Survey (Mr. Mike Harris, pers comm.) and NESBReC. An independent report to Aberdeen City Council was also made available (Harris, 1997).

10.3.47 Where the study corridor crosses existing roads, and for the period from 1992 to 2004, five badger RTAs were recorded on the A90, seven on the A96, two on the A947, three on the B9077, three on the B977, three on the B999 and a total of nine on unclassified roads. Full details on the locations of these records are provided in Appendix A10.2 (confidential report, as explained in paragraph 10.3.48 below).

10.3.48 Badger setts were located through a combination of consultation and survey, and informed the impact assessment as reported in this chapter. Due to risk of badger baiting and snaring, the precise locations are not published within the ES, but have been included as part of Appendix A10.2, submitted as a confidential report to SNH and Scottish Executive.

Field Survey

10.3.49 Badgers were found throughout the study area, with setts identified in each of the five route sections.

10.3.50 A total of 14 social groups were clearly identified during the survey (referred to as NA-NF and N-NO). One potential additional social group was identified, this is social group NG. Following bait marking, it remained unclear whether NG formed a subsidiary sett of another social group, or whether it was a discreet social group in its own right

10.3.51 Setts were identified south of Brimmond Hill, at Craibstone, Kirkhill Forest, Goval Burn and Harehill. The greatest density of badgers was in the vicinity of Kirkhill Forest, and this is likely to be due to the suitability of the area for sett making (i.e. the availability of vegetative cover, sloping ground and little human disturbance). The forest offers shelter and foraging opportunities, as well as ready access to foraging in adjacent pasture and arable land. The forest provides a secure commuting environment for social groups through its links to other woodlands in the area.

10.3.52 Land south of Kirkhill is severed by the A96 and the A944, which is likely to limit the movement of badgers. Several badger fatalities have been recorded on these roads (see paragraph 10.3.47).

10.3.53 North and east of Kirkhill, the landscape changes from coniferous plantation, to the fertile river valley of the River Don, becoming increasingly exposed towards the coast. The River Don and Goval Burn provide sett-making habitat in riparian banks and also offer good foraging in the adjacent productive pasture land. Further east, the soils are thinner and woodland is sparse, and consequently foraging habitat is inferior.

10.3.54 Where social groups are less densely distributed, and have large territories, they are unlikely to defend territorial boundaries, but where territories are restricted and groups abut, they share defended territorial boundaries. Further details of badger populations throughout the Northern Leg route corridor are presented in the evaluation section.

Bats

10.3.55 Bats and their roosts are protected under Schedule 5 of the WCA, which has been further amended by the Nature Conservation (Scotland) Act (2004), and Annex IV of the Habitats Directive (transposed as Schedule 2 of the Conservation (Natural Habitats and c.) Regulations (1994). Under these Acts it is an offence to inter alia intentionally or recklessly kill, injure or capture; recklessly disturb bats; and damage, destroy or obstruct access to bat roosts. Bats (with the exception of the common pipistrelle) are further protected though inclusion in Appendix II of the Bern Convention (1979) and the Convention on the Conservation of Migratory Species of Wild Animals (the Bonn Convention, 1972).

10.3.56 Pipistrelle bats are priority species in the UK BAP and Daubenton's bats are included in the NES LBAP.

Consultation and Literature Review

10.3.57 Five bat species have been reported breeding in Aberdeenshire (Ms Isobel Davidson, Aberdeen Bat Group, pers comm.):

- common pipistrelle bat (*Pipistrellus pipistrellus*);
- soprano pipistrelle bat (*Pipistrellus pygmaeus*);
- brown long-eared bat (*Plecotus auritus*);
- Daubenton's bat (*Myotis daubentonii*); and
- Natterer's bat (*Myotis nattereri*).

10.3.58 There have been isolated sightings of Nathusius' pipistrelle near Aberdeen and Leisler's bats have been recorded foraging near Peterculter, although the status of the species is currently unclear (Mr. Rob Raynor, SNH, pers comm.). The three pipistrelle species are referred to collectively hereafter as pipistrelles.

10.3.59 No recent data for the study area were available from NESBReC or the University of Aberdeen, although a number of scientific papers on bats in the area have been published (Rydell et al., 1994). Aberdeen Bat Group provided general records regarding the location of known bat roosts, with one location within the study corridor (recorded in 1989 at NJ 890 130, although no information is available regarding the precise location of the roost or species present).

Field Survey

10.3.60 Aberdeen is close to the northern limit of the distribution range of several bat species in Scotland. As a result, it is likely that when more than two bats are observed using a feature in a given period of time, the number observed may be significant in terms of the total population for that particular location (Dr Susan Swift, licensed bat surveyor, pers comm.).

10.3.61 Bat numbers were variable along the route reflecting the suitability of the habitat. The total numbers of bats recorded and bat activity were observed to be highest in the north and east of the study area compared with the south section of the route (Figures 10.4a-g).

10.3.62 Section NL1 is characterised by farmland with inherently low value to bats; few features offering shelter for foraging, roosting or commuting. There is one anecdotal record of a roost in Newton Farm and roosting opportunities in trees near Brimmond Hill and Newhills.

10.3.63 Low levels of bat activity were recorded during evening activity surveys, which reflects the exposed nature of Brimmond Hill and the lack of shelter and foraging resources in this area. At least six bat passes from at least two species (common pipistrelle and Daubenton's bat) were recorded. Bats have been reported foraging at Kepplestone House, and were observed foraging over a pond at

Brimmond Hill and over Gough Burn. Kepplehill Burn offers potential as a foraging area. Commuting routes were identified along Gough Burn and Ashton Road, where bats were recorded commuting from west to east shortly after sunset: indicating that bats roosting in the west (potentially in Tyrebagger or Ashtown) may forage in the east, potentially around Newhills). The bat survey results for Section NL1 of the Northern Leg are shown in Figures 10.4a-b.

10.3.64 Section NL2 contains 11 Habitat Areas and is characterised by areas of semi-natural broad-leaved woodland and blocks of commercial plantation woodland in the Craibstone Estate, connecting areas of agricultural land and amenity grassland. The woodland areas are considered to provide an excellent habitat resource with strategic importance due to their location in a green corridor, which includes Tyrebagger and Kirkhill Forest to the west and north. Although no roosts have been identified in this area, potential roosts were recorded in woodland areas on the Craibstone Estate and in buildings in the area.

10.3.65 Fifteen bat passes from two species (common and soprano pipistrelles) were recorded in this section. Commuting routes were identified along Gough Burn which provides a route north-south between potential roosts in the Craibstone Estate and foraging areas in the south; and in adjacent woodland areas, including woodland in the west of the SAC campus, and along Green Burn which provides a, east-west route in the SAC campus. Foraging areas were identified near Gough, Craibstone and Green Burns and adjacent woodland and farmland areas within the SAC campus. Only common and soprano pipistrelle bats were recorded in this section. The bat survey results for Section NL2 are shown in Figure 10.4b.

10.3.66 There are 20 Habitat Areas in Section NL3. The section is characterised by large open and exposed areas of farmland and extensive areas of mixed-age conifer plantation woodland including Kirkhill Forest, Standingstones Wood, East Woodland and Monument Wood, with the best foraging and tree roost potential along Bogenjoss Burn. Bat roosts have been identified at Walton Farm (soprano pipistrelles) (NJ 873 114) and at Sunnybrae Cottage (NJ 875 112) which are close to potential foraging habitat in the Craibstone Estate. Three potential hibernacula were recorded at Balgosie, a pump house in East Woodlands and a derelict stone cottage. Kirkhill Forest, Standingstones Wood and East Woodlands are considered to be of strategic importance to bats roosting in Aberdeen due to their location in a green corridor, which also includes the Craibstone Estate in Section NL2.

10.3.67 Evening surveys identified 41 bats and bat passes from at least three species (common and soprano pipistrelle bats and Daubenton's bats) with activity concentrated close to shelter at Standingstones Wood and Farm, around open areas in Kirkhill Forest and along Bogenjoss Burn, Commuting routes were identified along Kirkhill Forest South near the potential roost at Balgosie where bats were observed passing from north to south along the forest edge, possibly between foraging areas to the north (including East Woodlands and Bogenjoss Burn) and south (including Tyrebagger Woods and the Craibstone Estate). Commuting bats were also observed using a network of walls and ditches near Standingstones Farm, commuting along Bogenjoss Burn which connects with the River Don and provides excellent, sheltered riparian habitat including mature broadleaved trees; and along the edges of East Woodlands. Foraging areas were identified at Standingstones Wood, Bogenjoss Burn, East Woodlands and Monument Wood although much of the land surrounding these areas is agricultural land with low inherent value to bats. The results from Section NL3 are shown in Figures 10.4b-d.

10.3.68 Section NL4 of the Northern Leg contains 22 Habitat Areas. Features of value to bats include a potentially large roost at Parkhill Pumping Station, a potential hibernaculum in a WW2 pillbox near Dyce Drive, and many more potential roosts within trees and buildings. The section is characterised by large areas of agricultural land with extensive areas of broad-leaved and mixed woodland at Goval Wood and Goval Belt, the Parkhill Estate, Skate Wood and Den Wood. The River Don provides an important source of freshwater invertebrate prey connecting foraging and roosting resources up- and downstream. Goval Burn, the Formartine and Buchan Way and Goval Belt also provide diverse foraging opportunities and enhance connectivity between foraging and roosting areas.

10.3.69 At least 35 bats and bat passes from four species (common and soprano pipistrelles, brown long-eared and Daubenton's bats) were recorded within this section. Pipistrelle bat activity was concentrated around buildings and trees at Overton, the River Don, Goval area and Waulkmill. Daubenton's bat activity was limited to the River Don, although Goval Reservoir, Lade and Burn also provide good foraging opportunities for this species. Brown long-eared bats were recorded around Waulkmill, which is within 1km of excellent broadleaved woodland foraging habitat at Parkhill and Goval Wood. Common and soprano pipistrelles and Daubenton's bats forage and commute regularly along the River Don; and a Leisler's bat, a rare vagrant species, was reported in Seaton Park approximately 10km downstream in 1993 (Racey et al., 1993). Commuting routes were also recorded along Goval Burn, Goval Belt, the Formartine and Buchan Way, near Meadowhead Burn and Newpark Steading, of bats presumed to commute between potential roosts and foraging areas including the Parkhill, Goval and Red Moss areas. Foraging areas were identified around Upper Kirkton, along the River Don and banks, the edges of Goval Wood, along Goval Burn, Goval Reservoir and Goval Mill Lade, along the Formartine and Buchan Way and Goval Belt. The results from this section of the Northern Leg are shown in Figures 10.4d-e.

10.3.70 Section NL5 of the Northern Leg contains 25 Habitat Areas and is characterised by large and relatively exposed areas of farmland, with extensive areas of mixed and broad-leaved woodland at Red Moss and formerly Littlejohn's Wood, which form part of an important green corridor also including Den Wood and Corsehill Wood to the west. The south of the section includes three large lochs (Bishops, Lily and Corby Lochs) and to the east, tree lines around Cranfield provide an extensively used foraging and commuting resource in an area otherwise sparse in alternative resources. Harehill and Blackdog Burns provide some connectivity between Habitat Areas. A small roost was identified in a tree at Cranfield and there is anecdotal evidence of a roost in a cottage at Harehill.

10.3.71 Activity surveys revealed 71 bat passes from four species (common and soprano pipistrelles, brown long-eared and *Myotis* bats; presumed to be Daubenton's). Foraging areas were identified at Littlejohn's Wood, Moss Belt, Red Moss and Harehill, shelterbelts at Cranfield and Harehill and aquatic habitats at ponds at Loch Hills Farm and to the east of Corby Loch and Blackdog Burn. *Myotis* sp. (likely to be Daubenton's bats) were recorded foraging over a pond at Newton of Shielhill and are likely to use the large open water habitat provided by Corby and Lily Lochs as well as smaller ponds. Brown long-eared bats were recorded in Red Moss which is the largest area of broadleaved woodland in the section and which may support the same population that was recorded in the Waulkmill area. Commuting routes were identified near Littlejohn's Wood (as per Section NL4); along the B999, along rides in Red Moss, near Lochgreens, along shelterbelts and tree lines at Cranfield and along Harehill and Blackdog Burns where linear features connect local foraging and roosting resources. The results from Section NL5 are shown in Figures 10.4e-g.

Breeding Birds

10.3.72 The Birds Directive (1979) provides full protection for all Annex I species and their habitats, listing species that may be conditionally hunted in Annex II and III. Under the WCA (1981) (which has been further amended by the Nature Conservation (Scotland) Act, 2004) all wild birds, their nests and eggs are protected. However, Game birds are not included in this definition (except for limited parts of the Act, Schedule 2) although are covered by the Game Acts, which confer protection during the closed season. Schedule 1 birds that may be present along the route include the fieldfare (*Turdus pilaris*), kingfisher (*Alcedo atthis*) and osprey (*Pandion haliaetus*).

Consultation and Literature Review

10.3.73 SNH did not provide any records of breeding birds in their consultation correspondence.

10.3.74 Consultation with the Royal Society for the Protection of Birds (RSPB) confirmed that there are no RSPB nature reserves within or adjacent to the proposed scheme study area. However, a record of osprey near Fintry (a WCA (1981) Schedule 1i, NES LBAP and JNCC Amber List Species) was provided by the RSPB, although a nesting location could not be specified (Mr. Ian Francis, pers comm.).

10.3.75 Scottish Ornithologists' Club (SOC) and the RSPB are jointly involved in a 5-year project to produce a Breeding Bird Atlas for Aberdeenshire in 2006. Records of confirmed, possible and probable breeding bird species were available for some areas within the route corridor. However, survey data were not obtained from SOC and the RSPB for the following reasons:

- the data were not of sufficient detail in terms of the location of bird species for an EIA (the survey resolution was too large); and
- data derived from SOC/RSPB and Jacobs surveys were incompatible due to data collation differences. SOC/RSPB used the Brown and Shepherd (1993) method for surveying upland breeding wader populations, whereas Jacobs surveyors used the Common Bird Census (CBC) methodology.

10.3.76 NESBReC identified the presence of breeding barn owl (*Tyto alba*) in the grounds of the SAC Craibstone Estate, although an exact nesting location could not be provided. Table 10.6 lists the available records of NES LBAP species for Craibstone Estate.

Table 10.6 - NES LBAP Species Present on the Craibstone Estate and their JNCC Status

Species	Status
Barn owl (*Tyto alba*)	CWA1i, JNCC Amber List, LBAP
Bullfinch (*Pyrrhula pyrrhula)*	JNCC Red List, UK BAP, LBAP
Kestrel (*Falco tinnunculus)*	JNCC Amber List, LBAP
Lapwing (*Vanellus vanellus)*	JNCC Amber List, LBAP
Linnet (*Carduelis cannabina)*	JNCC Amber List, UK BAP, LBAP
Skylark (*Alauda arvensis)*	JNCC Red List, UK BAP, LBAP
Song thrush (*Turdus philomelos)*	JNCC Red List, UK BAP, LBAP
Tree sparrow (*Passer montanus)*	JNCC Red List, UK BAP, LBAP
Yellowhammer (*Emberiza citronella)*	JNCC Red List, LBAP

Field Survey

10.3.77 The breeding bird assemblage present in an area depends on the habitat types present and the suitability of those habitats for individual bird species. As described in Section 10.2 (Approach and Methods), breeding bird surveys were undertaken between April and June inclusive, in eight SOVs and 11 quadrats systematically arranged along the route corridor.

10.3.78 Corby and Lily Loch (SSSI) was the most important site for breeding birds in the Northern Leg and was identified as a SOV. The site supported a total of 34 bird species, including red throated diver *Pandion haliaetus* (a Birds Directive Annex 1 and WCA (1981) Schedule 1i species) and scaup *Aythya marila* (a WCA (1981) Schedule 1i species), in addition to 17 JNCC Red and Amber List species. The Craibstone site had anecdotal evidence of barn owl (a WCA (1981) Schedule 1i species), but presence and breeding were not confirmed. A total of 33 species were recorded at Craibstone, including 15 JNCC Red and Amber List species. Other sites with notable assemblages included Kirkhill Forest, Bogenjoss Burn and Monument Wood and Gourdieburn. Of the identified SOVs, the least valuable sites for breeding birds were Red Moss (West) and Cranfield Heath where five JNCC Red and Amber List species were recorded and total numbers of species recorded were 15 and 13, respectively (Figures 10.5a-g).

10.3.79 No WCA (1981) Schedule 1i listed birds were recorded in any of the quadrats with the exception of quadrat 6 and 8 where a whooper swan (*Cygnus cygnus*) and a pair of non-breeding little-ringed plovers (*Charadrius dubius*) were noted respectively. Considerable numbers of JNCC Red and Amber List species were recorded at Newton, the River Don, Goval Reservoir and Meadowhead, and Blackdog Burn. The numbers of species recorded ranged from 30 to 35, with between 14 and 19 JNCC Red and Amber List species in each quadrat.

10.3.80 Quadrats at Loch Hills Farm and Red Moss Burn/Corby Loch had a less diverse assemblage of breeding birds (each quadrat supporting a total of 26 species), nevertheless 13 and 16 JNCC Red and Amber List species were present (respectively). The species recorded may be influenced by the close proximity of Corby, Lily and Bishop's Lochs. Of the quadrats surveyed, agricultural land at

Cranfield Farm was of least value to breeding birds with only 13 species recorded (of which six were Red and Amber List species).

10.3.81 Ospreys were observed fishing in the vicinity of the River Don during ecology surveys. Subsequent investigation by Jacobs surveyors identified a breeding pair of osprey on the Loch of Skene, approximately 11.5km from the River Don. It is possible that this pair of nesting osprey is the pair recorded feeding on the River Don. Breeding osprey territories often cover an area of >14km^2 (Poole et al., 2002).

Wintering Birds

10.3.82 As noted above, legal protection of birds is provided by the Birds Directive (1979), the WCA (1981), and the Nature Conservation (Scotland) Act (2004).

Consultation and Literature Review

10.3.83 Records of wintering bird species and assemblages within the study area were obtained from the BTO, WWT and the RSPB. SNH did not hold any additional data on wintering bird species. The North East Scotland Bird Report (2003) was reviewed for information on wintering species within the study corridor.

10.3.84 A 5-year summary of the Wetland Bird Survey (WeBS) data (1999/2000 to 2003/4) for Corby Loch was provided by the BTO. A 5-year peak count for Icelandic greylag goose *Anser* anser at Corby Loch was 12 birds in October 2002, and a 5-year peak count for pink-footed goose (*Anser brachyrynchus*) was 11 birds in January 2004.

10.3.85 The Corby, Lily and Bishop Lochs composite SSSI (Figure 10.1d) was considered, but not selected, as an SPA for Icelandic greylag geese. It was not judged to add significantly to the range or numbers of these species in the Grampian region (www.jncc.gov.uk). However, the pink-footed goose and Icelandic greylag goose populations present there, are considered to be of national importance due to the large assemblages that form during passage and wintering periods. Although the geese are not listed as Annex I (Birds Directive), Schedule 1(WCA, 1981), Red List (JNCC) or NES LBAP species, they are considered in the wintering birds assessment as species of conservation concern. Both species are listed in Annex II of the Birds Directive as migratory species of conservation importance. Corby, Lily and Bishop Lochs composite SSSI (NJ912143) is also notified due to the assemblages of winter wildfowl that congregate there.

Field Survey

10.3.86 As with breeding birds, the wintering bird assemblage present in an area depends on the habitat types present and the suitability of those habitats for individual bird species. The wintering bird surveys were undertaken at WOVs and in selected quadrats in the route corridor.

10.3.87 Twenty-one bird species were recorded at Corby, Lily and Bishop's Lochs SSSI, which was identified as a WOV; 14 Amber listed and 7 Green listed species. Most were common residents or common winter visitors, but smew (*Mergus albellus*), although Green listed, is a scarce winter visitor in NE Scotland, and is listed in Annex I of the European Birds Directive.

10.3.88 Of the other species, the most important were the large assemblages of pink-footed and Icelandic greylag geese recorded mainly in November and December 2004, with smaller numbers occurring from January to March 2005 (Figures 10.5a-g).

10.3.89 Within the selected quadrat at Nether Kirkton on the west bank of the River Don, 26 species were recorded including smew and two WCA Schedule 1i listed species (fieldfare *Turdus pilaris* and whooper swan *Cygnus cygnus*). Fourteen Red and Amber listed species were recorded here (Figure 10.5d-e).

10.3.90 Fife Hill (near the Blackdog Industrial Estate) also had a diverse suite of wintering birds (total 22), including two uncommon residents in the Aberdeen area; the merlin (*Falco columbarius*) that is listed on Annex I and WCA (1981) Schedule 1i, and the raven (*Corvus corax*). In addition, 14 red and Amber listed species were noted (Figure 10.5g).

10.3.91 Five identified quadrats of value to wintering birds were Kepplestone (near the Gough Burn DWS), Craibstone (including the Craibstone Pond), Howemoss Burn (at Newton across the A96 from Craibstone), Goval Mill Lade, and Backhill of Cranbog (to the east of Corby Loch). These quadrats had a total number of wintering birds recorded ranging from 18 to 26, and the number of Red and Amber listed species from 12 to 14, including one or two WCA (1981) Schedule 1i listed species (Figures 10.5a-g).

10.3.92 The least valuable quadrats were at Denhead of Cloghill and West Hatton Wood, Bogenjoss Burn, Goval Burn and Lochgreens Farm. The total number of species recorded ranged from 13 to 19 and the number of Red and Amber listed species ranged from six to eight (Figures 10.5a-g).

Otter

10.3.93 The European otter (*Lutra lutra*) is fully protected by UK law through inclusion in Schedule 5 of the WCA (1981), which has been further amended by the Nature Conservation (Scotland) Act (2004). Further protection is provided under Schedule 2 of the Conservation (Natural Habitats & c.) Regulations 1994. Under this legislation it is an offence to inter alia intentionally or recklessly kill, injure or disturb otters, and/or intentionally or recklessly obstruct, damage or destroy otter holts or couches. The otter is also listed on Appendix 1 of the Convention on International Trade of Endangered Species (CITES), Appendix II of the Bern Convention and Annexes II and IV of the Habitats Directive.

10.3.94 The otter is a priority species in the UK BAP. However, the otter is not threatened or rare in the region or county, and is not an NES LBAP priority species.

Consultation and Literature Review

10.3.95 National population surveys of otters were carried out in 1977-1979, 1984-1986 and 1991-1994 in response to a perceived decline in numbers. In the 1991-1994 survey, otters were recorded at 88% of sites surveyed in Scotland, representing a rise of 15% over the results from the first survey (Green and Green, 1997). Otters are now believed to be present in every river catchment in Scotland (Grogan et al., 2001).

10.3.96 The National Otter Survey of Scotland 1991-1994 (Green and Green, 1994) identified a rise of 2% in the number of positive sites in the Grampian region. The majority of negative sites (i.e. no otters recorded) were along isolated coastal fringes.

10.3.97 Consultation with SNH, Grampian Badger Survey, Aberdeen City Council, the NES LBAP Co-ordinator, NESBReC and SWT took place in March 2004. CEH at Banchory provided three records of otter RTAs within the study area, dating from 1995 to 2001, one on the A947, one on the B999, and one on the B977. Full details of locations of these RTAs are provided in Figures 10.6a-g and Appendix A10.6.

Field Survey

10.3.98 Favourable habitat for otters is indicated by good vegetative cover and a low likelihood of disturbance. Water quality and the presence of prey items are also important. For example, Gough and Craibstone Burns are tributaries of the River Don and contain several species of fish including salmonids and eel. The burns also offer good undisturbed cover for lying-up in the form of mature woodland with dead wood and dense thickets of rhododendron. Otters also use interconnected watercourses as commuting routes, and may travel cross-country between watercourses. Isolated waterbodies are less favoured, although they are used. The baseline data are discussed further in

the evaluation section of this document and full details of the survey results are presented in Table 4 of Appendix A10.6.

10.3.99 Although signs of otter were found throughout the Northern Leg, the northern part of the study area had the greatest evidence of otter presence. The River Don had numerous sprainting sites indicating that otters regularly use the river, and is also likely to function as a commuting route to other tributary streams and catchments, facilitating the immigration and dispersal of otters.

10.3.100 The Goval Burn was a core area of otter activity with three couches (Couches 2-4), five holts (Holts 2-6) and numerous other field signs such as prints, sign heaps and spraint sites being observed (Figures 10.6a-g). Otter RTAs are not uncommon; an otter RTA was recorded where the A947 crosses the lade with an otter pathway on the north bank indicating that otters use this area as a crossing point.

10.3.101 Corby Loch is the largest area of open water in the study corridor. The lower reaches of Red Moss Burn near its confluence with Corby Loch and the shores of the Loch showed several signs of otter activity. The burn provides a potentially important commuting route between the River Don and Corby Loch (via Corsehill Burn and Goval Burn). An otter was killed in 1998 attempting to cross the road that passes over the burn at NJ 923152 (Mr Ian Muir, Corby Loch Angling Syndicate, pers comm.).

10.3.102 Tall grass, herbaceous vegetation and patches of gorse, all providing good cover, border the lower reaches of Blackdog Burn. The burn also supports otter food resources (e.g. fish), but suffers from low to moderate levels of disturbance from nearby housing and Blackdog Industrial Estate. The burn provides a commuting route to the coast.

Red Squirrel

10.3.103 Red squirrels (*Sciurus vulgaris*) are protected by UK law through inclusion on Schedule 5 and 6 of the WCA (1981), which has been further amended by the Nature Conservation (Scotland) Act (2004). It is an offence to intentionally or recklessly kill, injure, take or possess a wild red squirrel, or to intentionally or recklessly damage, destroy or obstruct access to any structure or place used by a red squirrel for shelter or breeding. It is also prohibited to intentionally or recklessly disturb a red squirrel while it is occupying a structure or place for protection, or to kill or capture red squirrels by indiscriminate methods such as snaring or poisoning. The red squirrel is further protected by the Wild Mammals (Protection) Act 1996 and through inclusion in Appendix III of the Bern Convention. The red squirrel is listed as a Priority Species on the UK BAP and is also an NES LBAP species.

Consultation and Literature Review

10.3.104 Records of red squirrel presence (post 2000) held by NESBReC include SAC Craibstone (NJ 87 10 and NJ 87 11), Parkhead Wood (NJ 86 10), East Woodlands (NJ 857140) and Monument Wood (NJ 865 144) and are presented on Figures 10.7a-g and in Appendix A10.7.

10.3.105 The Forestry Commission Woodland Officer and Chairman of the Grampian Squirrel Group, provided a list of woodlands where red squirrels have been recorded since 2000. These supplement the existing NESBReC records with some overlap. These records are shown in Table 10.7 and illustrated on Figures 10.7a-g. Grid references for red squirrel sightings outside the 1km study corridor are marked with an asterisk. Other records included incidental sightings of red squirrel throughout Kirkhill Forest, Pitmedden House Wood and at Monument Wood (Mr. Gavin Legge, pers comm.) and at Goval and Littlejohn's Wood (local resident, pers comm.).

Table 10.7 - Grampian Squirrel Group Records of Red Squirrel Presence in Local Woodlands

Wood Name	National Grid Reference
Craibstone Scottish Agricultural College (SAC)	NJ 870 105
Monument Wood	NJ 863 144
Monument Wood	NJ 865 143
West Woods	NJ 860 104*
Kirkhill Forest	NJ 845 121*
Kirkhill Forest	NJ 847 123*
Kirkhill Forest	NJ 844 126*

** denotes sightings recorded outwith the study area*

Field Survey

10.3.106 Aberdeenshire is on the edge of the current northern distribution of the grey squirrel, which competes with the red squirrel where the two occur together. Grey squirrel is a carrier of the Squirrelpox virus that is potentially fatal for the red squirrel, whilst the grey squirrel appears unaffected. This virus has been considered to be a major factor in the replacement of reds by greys (Rushton et al., 2000; Tompkins et al., 2003). Although, the first incidence of Squirrelpox virus in Scotland was recorded from a grey squirrel in the Borders, in August 2001, as of yet, the disease has not been detected in red squirrels in Scotland (SNH, 2004a).

10.3.107 In general, small, isolated woodlands are unlikely to be used by red squirrels Dense semi-mature sitka spruce plantations, of which there is much in the study area, also offer limited opportunities for red squirrels, although they may provide a refuge habitat for red squirrels due to their unsuitability for grey squirrels (SNH, 2004a).

10.3.108 The results of the two hair-tube surveys between May and July 2004 showed that red squirrels were present in seven of the 12 woodland areas surveyed: Newhills North, Craibstone South, West Woods, Kirkhill Forest (North), East Woodlands, Monument Wood and Littlejohn's Wood. Grey squirrels were present and co-existing with red squirrels in Craibstone South. Five incidental sightings were made of red squirrels during surveys: one in East Woodlands, two individuals were seen near a drey in Craibstone North, and one in each of Kirkhill Forest, Goval Wood and Littlejohn's Wood (Figures 10.7a-g). The consultation exercise revealed records of red squirrels in a further three woodlands; Parkhead Wood, Kirkhill Forest (South) and Standingstones Wood. Taking a precautionary approach, red squirrels were therefore considered to be present in 12 of the woodlands in the study area.

10.3.109 The woodlands in the Craibstone area are managed to create an open canopy, and the structure and variety of tree species present makes Craibstone an important area for red squirrel conservation.

10.3.110 There are a number of woodland areas within the study area that are part of, connected to, or contiguous with, Kirkhill Forest, a conifer plantation of more than 400ha. These include Kirkhill Forest North and South, Standingstones Wood and East Woodlands. There have been at least three anecdotal sightings of red squirrels in Standingstones Wood and it seems likely that there is a stable red squirrel population in the area. Grey squirrels were not recorded in any of these woodlands or in Littlejohn's and Monument Wood to the North (Table 8, Appendix A10.7). Due to the size of the woodland, and the age and mixture of tree species present, these woodlands are considered core habitat for red squirrels in the Aberdeenshire area.

10.3.111 Monument Wood (approximately 10ha) is a mature Scot's pine and larch plantation, with red squirrels that have been seen to commute between here and East Woodlands, a distance of approximately 150-200m (local resident; pers comm.). Even though East Woodlands is relatively small, red squirrels almost certainly breed at this location, as dreys have been recorded there (Mr. Gavin Legge; pers comm.).

10.3.112 Goval Wood and Littlejohn's Wood (including Corsehill Wood) are part of larger contiguous areas of mixed woodland, and both have tree species that are attractive to red squirrels, visual sightings of red squirrels were recorded in both of these woodlands by both Jacobs surveyors and local residents (pers comm.).

Water Vole

10.3.113 The water vole (*Arvicola terrestris*) is afforded partial protection by the WCA (1981) through inclusion in Schedule 5, and the Nature Conservation (Scotland) Act 2004, which revised Part 1 of the WCA (1981). Under this legislation, it is an offence to intentionally damage, destroy or obstruct access to any structure or place that water voles use for shelter or protection, or to disturb water voles while they are using such a place. However, a recent JNCC review of the WCA in 2005 recommended full protection in Schedule 5. This would provide a similar level of protection to that of species such as otter. A date for ratification of these amendments has not yet been set.

Consultation and Literature Review

10.3.114 No water vole surveys were undertaken prior to this study within the study corridor. However, water voles are known to be present in the wider area of NE Scotland; the 1996 National Water Vole Survey found remnant water vole populations present at a few isolated locations in the Upper Dee catchments (Jefferies 2003). Water vole colonies were also identified in low numbers in other river catchments in NE Scotland including lowland farmland of Buchan and tributaries of the River Ythan.

10.3.115 Water voles were not recorded in the 1996 survey at sites on the Lower Don that had water voles during the 1990 survey, and no new sites were identified. Mink (water vole predators) were recorded throughout the Don catchment during the 1996 survey.

10.3.116 However, in 2006, water vole surveys were undertaken by Jacobs as part of the AWPR Fastlink options appraisal. This survey recorded evidence of water voles at a fishing pond (Fishmeyre Pond, NO 861 903) and at other waterbodies nearby: Green Ditch (NO 874 901 - NO 869 903), and at Fishermyre Moss (NO 866 904). This water vole population lies approximately 18km south of the start of the Northern Leg, as reported in Chapter 40 (Ecology and Nature Conservation; Fastlink).

Field Survey

10.3.117 No water vole field signs were found in the study corridor. However, good potential water vole habitat was recorded at West Brimmondside Pond the River Don, and along stretches of Blackdog Burn. Mink, which predate water vole, were present throughout the study area, and this may explain an absence of signs of water vole.

Amphibians

10.3.118 All six species of amphibian native to the UK are subject to legal protection, although the level and type of protection varies between species. Great crested newt (*Triturus cristatus*) and natterjack toad (*Bufo calamita*) are protected from killing and injury, and disturbance to their habitats through their inclusion in Appendix 5 of the WCA (1981), the Nature Conservation (Scotland) Act (2004), and the Conservation (Natural Habitats and c.) Regulations (1994). Smooth newt (*Triturus vulgaris*), palmate newt (*Triturus helveticus*), common frog (*Rana rana*) and common toad (*Bufo bufo*) are protected from being sold through inclusion in Appendix 5 of the WCA (1981) and the Nature Conservation (Scotland) Act (2004).

Consultation and Literature Review

10.3.119 Consultation with SNH, Aberdeen City Council, the NES LBAP Co-ordinator, NESBReC and the local herpetofauna recorder (Mr. Bob Laing) did not identify any historic records of amphibians within the study area.

Field Survey

10.3.120 Three species of amphibian were recorded. Common frog was frequent and widespread throughout the route corridor, whereas common toad were more localised and palmate newt records were isolated (Figures 10.9a-d).

Brown Hare

10.3.121 Brown hare (*Lepus europaeus*) is offered limited protection by the Ground Game Act 1880, Hare Preservation Act 1892, and the Wild Mammals (Protection) Act 1996, which protect against 'unnecessary suffering', but there is no legal protection from being killed in a 'swift and humane way'. However, they are a priority UK BAP species and an NES LBAP species due to their general decline caused by changes in farming practices and hunting.

Consultation and Literature Review

10.3.122 Consultation with SNH, Aberdeen City Council, the NES LBAP Co-ordinator and NESBReC provided no records of hares within the Northern Leg study area.

Field Survey

10.3.123 Good areas of habitat for hares were recorded throughout the study area, particularly in Section NL3 surrounding Howemoss (for further details see Table 4, Appendix A10.10) with a mixture of pasture, woodland, cereals, root crops and set-aside. This allows hares to graze different crops and grass when conditions are right. During the summer, long cereals provide good cover for adults and leverets, and the pasture areas offer good grazing. In the winter, root crops and winter cereals provide cover and food and the woodlands shelter from severe weather.

10.3.124 Twelve hare sightings were recorded, three of which were individual sightings in the same field at NJ 862 125 (Figures 10.10a-d), adjacent to Howemoss Farm. These records may represent different animals or may be repeat observations of the same hare. One hare sighting was recorded in an arable field at NJ 919 149. All hare sightings are shown on Figures 10.10a-d. An additional 20 hares have been recorded in the vicinity of Hillhead of Derbeth and West Brimmondside (local farmer, pers comm.).

Deer

10.3.125 Roe deer does not have any specific legal protection for nature conservation although it is listed in Appendix III of the Bern Convention, under which their exploitation is subject to regulation. The Deer (Scotland) Act (1996) is the main legal instrument governing the management of wild deer. The Nature Conservation (Scotland) Act (2004), the Scottish Biodiversity Strategy (Scottish Executive) (2004) and the Land Reform Act (2003) also have implications for their management.

10.3.126 Only one species of deer (roe deer; *Capreolus capreolus*) was recorded within the study corridor. As roe deer do not have any specific legal protection for nature conservation, no ecological impact assessment has been undertaken. Appendix A10.11 describes surveys and assessment undertaken to inform a risk-assessment based approach, which identifies key areas where there is a risk of deer/vehicle collisions. The data on deer have been included in the context of a potential traffic hazard associated with the proposed scheme, rather than because of their nature conservation value.

Reptiles

10.3.127 There are six species of reptile native to the UK; the common lizard (*Lacerta vivipara*), sand lizard (*Lacerta agilis*), slow-worm (*Anguis fragilis*), smooth snake (*Coronella austriaca*), grass snake (*Natrix natrix*), and adder (*Vipera berus*). In addition, there are several introduced species arising from escapes or illegal releases, which may be encountered occasionally (English Nature, 2004).

Common lizard, slow-worm and adder are common and widespread throughout the UK and receive limited protection under the WCA (1981) and the Nature Conservation (Scoltland) Act (2004), which makes it an offence to intentionally or recklessly kill or injure these animals.

Consultation and Literature Review

10.3.128 The only reptile species recorded within 50km of Aberdeen are the common lizard, slow-worm and adder (Arnold, 1995; Reading et al., 1995; Reading et al., 1996). A questionnaire survey carried out in 1992, recorded adders in all 10km^2 grid squares around Aberdeen, (Reading et al., 1995; Reading et al., 1996). In the questionnaire survey, the key changes in land use over time were perceived to be afforestation, changes in agricultural practices, and loss of habitat and disturbance due to recreation and/or development (Reading et al., 1995). These factors may have had further effects on populations of reptiles in the Aberdeen area over the past 20 years.

10.3.129 A review of information from the National Biodiversity Network (NBN) revealed no records of reptiles within any of the10km^2 grid squares that the road alignment passes through.

Field Survey

10.3.130 No reptiles were found during dedicated surveys of the study area. However, suitable habitat was recorded and presence cannot be discounted (Figures 10.8a-g).

Terrestrial Invertebrates

10.3.131 There are a number of terrestrial invertebrates included in Schedule 5 of the WCA (1981) and the Nature Conservation (Scotland) Act (2004) that are given full or part protection. These include species of beetles, butterflies, moths, true bugs, crickets, dragonflies, spiders, annelid worms and molluscs. Invertebrates are important in both ecosystem functioning and in agricultural systems. As herbivores, predators, parasites and as a food source for other species, they are a vital element in terrestrial food chains.

Consultation and Literature Review

10.3.132 Consultation was undertaken with a variety of statutory and non-government organisations including, NESBReC and the Local Biodiversity Officer. The likelihood of particular species being present in the area was assessed, based on previous records detailed in the NBN Gateway and in Alexander et al. (1998). Entomologists acting as Local Recorders were also consulted to assess the likelihood of potential species occupying the habitats within the study area.

10.3.133 A combination of North East Scotland Biodiversity Audit Data (2003), NES BAP and UK BAP data, and local entomologist recorder information was used to produce a table of potential invertebrates of local significance (Appendix A10.14). NESBReC currently only holds non-confidential records of two of these species near Aberdeen: the pyralid moth (*Catoptria permutatella*) and sword-grass moth (*Xylena exsoleta*). Records for other species are held, but most of these are from upper Deeside or the Morayshire coast.

Field Survey

10.3.134 Despite the study area being predominantly under intensive agricultural land use, suitable habitats for a range of terrestrial invertebrates were present including semi-natural and plantation woodland (wet, broad-leaved, mixed and coniferous), willow, alder, aspen and gorse scrub, marshy and acid grassland, tall ruderal vegetation, wet heath, wet and dry modified bog. There is also running water and/or open water present within the study corridor.

10.3.135 Areas with mosaic habitats have the best potential for invertebrates, there is potential for a range of nationally (UK BAP) and locally (LBAP) important species in Sections NL2 – NL5. The gorse dominance of Brimmond Hill lessens its appeal to ground dwelling invertebrates. Corby Loch in

Section NL5 has the potential for supporting the widest range of species due to the presence of grassland, heath and wetland surrounding the loch.

10.3.136 Habitat Areas in Sections NL2 - NL5 show potential to support two nationally important (UK BAP) species: the sword-grass moth (*Xylena exsoleta*) and the pearl-bordered fritillary butterfly (*Boloria euphrosyne*), and several locally important (NES Biodiversity Audit) species, including mountain whorl snail, (*Vertigo alpestris*), wall whorl snail, (*Vertigo pusilla*), the subterranean spider (*Lepthyphantes insignis*), small pearl-bordered fritillary butterfly (*Boloria selene*), and the large heath butterfly (*Coenonympha tullia*), in addition to a range of generic species.

Water Shrew

10.3.137 The water shrew (*Neomys fodiens*) is protected by the WCA (1981) through inclusion in Schedule 6. This has been further amended by the Nature Conservation (Scoltand) Act (2004), which prohibits killing and certain methods of capture.

Consultation and Literature Review

10.3.138 SNH, Aberdeen City Council, the NES LBAP Co-ordinator and NESBReC held no records of water shrew within 10km of the study area. There were few records for water shrew in NE Scotland. The lack of information may be due to under-recording rather than an absence of water shrew (Lesley Cropper, NESBReC, pers comm.).

Field Survey

10.3.139 No evidence of water shrew was recorded in any of the three study areas, although suitable water shrew habitat was identified (Figures 10.8a-g). During otter surveys (October 2004), a dead water shrew was found on an emergent boulder on Elrick Burn at NJ 889 169, approximately 1km north of the study corridor. This indicates that water shrew are potentially present in suitable habitat, despite the lack of survey evidence.

Fish

10.3.140 The Atlantic salmon (*Salmo salar*) is protected under the Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act (2003), which makes it an offence to knowingly take, injure or destroy any smolt, parr, salmon fry or alevin; injure or disturb any salmon spawn during the annual close time; obstruct or impede salmon passage for spawning. Atlantic salmon is also listed in Appendix III of the Bern Convention. Freshwater populations are listed in Annex II of the EC Habitats Directive and Schedule 3 of the Conservation Regulations (1994).

10.3.141 Brook lamprey, river lamprey (*Lampetra fluviatilis*) and sea lamprey (*Petromyzon marinus*) are listed in Annexes II and V of the EU Habitats Directive and Appendix III of the Bern Convention. All remaining fish species are not considered nationally scarce and are afforded no specific legal protection. They are on the UK BAP list and a draft Action Plan is in preparation. In Scotland, these species are not currently threatened, but are in decline (SNH, 2004b).

Consultation and Literature Review

10.3.142 The Don DSFB supplied fish data together with incomplete habitat data for the River Don and its major tributaries. The seven fish species of conservation value that are present in these watercourses are presented in Table 10.8. In addition to these species, a further five species are considered as likely to be present in an upland spate river in NE Scotland such as the River Don:

- river lamprey (*Lampetra fluviatilis*);
- sea lamprey (*Petromyzon marinus*);
- pike (*Esox lucius*); and
- perch (*Perca fluviatilis*).

Table 10.8 - Summary of Fish Presence (Source: Don DSFB)

Watercourse	Minnow	Brook lamprey	Sea trout	Eel	Stickleback	Brown trout	Salmon
River Don	✓	✓	✓	✓	✓	✓	✓
Goval Burn 1	✓	✓	✓	✓	x	✓	✓
Goval Burn 2	✓	✓	✓	✓	x	✓	✓
Green Burn	✓	✓	x	✓	x	✓	x
Gough Burn	✓	✓	x	✓	x	✓	x

10.3.143 The fisheries information was supplemented by water quality and biological data supplied by SEPA.

10.3.144 The results of the fish habitat assessment combined with the RHS data, indicated that brown trout (*Salmo trutta*), eel (*Anguilla anguilla*) and brook lamprey (*Lampetra planeri*) were likely or possible at all of the watercourses, with the exception of Bogenjoss Burn (site A, downstream at Bogenjoss) where only brownt trout and eel were likely to be present. The River Don was likely or possible to contain all 11 species for which the habitat was assessed, including pike and perch; salmon; river, brook and sea lamprey; brown and sea trout, eel, 3-spined stickleback (*Gasterosteu aculeatus*), and minnow (*Phoxinus phoxinus*). All 11 species for which the habitat was assessed were all possible or likely at Goval Burn, as were brook lamprey, brown trout, eel, 3-spined stickleback and minnow at the Mill Lade. 3-spined stickleback were also likely to be present at Corsehill and Red Moss Burn (Table 10.9).

Freshwater Habitats and Invertebrates

Consultation and Literature Review

10.3.145 SEPA monitors water quality and biological measures and has recent river classifications for five watercourses within the Northern Leg study area (Table 10.11). SEPA sampling point locations are shown in Figures 10.12a-g; data indicate that the water quality in the River Don and Blackdog Burn were classified in 2003 and 2004 as Grade A2 - 'good', whereas Goval Burn was classified as Grade B - 'fair'.

Field Survey

10.3.146 This baseline information is a combination of RHS data, water quality data and freshwater invertebrate data, as noted in Section 10.2 (Approach and Methods). As previously stated, severely modified watercourses were not surveyed by RHS. Kepplehill Burn, the Mill Lade, Corsehill and Red Moss Burns were assessed as severely modified as they function as straightened embanked land drains, and therefore not subject to RHS.

River Habitat Surveys

10.3.147 Gough Burn was assessed as being significantly modified, largely due to the upstream half of the survey reach that comprises a straightened channel running through the golf course. In contrast, the downstream reach flowing through the SAC campus at Craibstone was a naturally profiled, meandering burn running through mixed woodland.

10.3.148 Craibstone Burn was assessed as obviously modified as although there were areas where the banks had been reinforced with stonewalls and it was crossed by a couple of minor bridges, it was predominantly a naturally profiled meandering burn running through mixed woodland.

10.3.149 Green Burn was significantly modified mainly by long culverts and bank re-profiling.

10.3.150 Bogenjoss Burn at the upstream reach was assessed as obviously modified by bank reinforcement using stonewalls and channel straightening for long sections even though it is essentially a small burn flowing through a conifer woodland. In contrast, the downstream reach (the second crossing point for the proposed scheme) was assessed as predominantly unmodified since it is a

meandering burn with a complex riparian zone and a largely unmodified bank profile. The downstream reach is the least modified in the entire study zone as assessed by RHS.

10.3.151 The River Don was categorised as significantly modified due to extensive bank re-profiling and reinforcement. The RHS reach included one riffle section, which provided natural in-stream habitat.

10.3.152 Goval Burn was categorised as severely modified because of its connection to Mill Lade Aqueduct and its extensively reinforced and re-profiled banks.

10.3.153 Blackdog Burn was assessed as significantly modified as it is extensively straightened, re-profiled and reinforced along both banks.

Freshwater Invertebrates

10.3.154 The Mill Lade, as a totally artificial channel, was not surveyed for freshwater invertebrates. However, all other stated watercourses were surveyed. The findings of the invertebrate sampling were consistent with available SEPA water quality data.

10.3.155 The straightened section of Kepplehill Burn was classified as being of good ecological quality. The burn had a moderately diverse fauna comprising more pollution-tolerant stoneflies, mayflies and cased caddisflies with a range of true flies (dipterans).

10.3.156 Gough, Craibstone and Green Burns are all located in close proximity and were assessed as being of excellent ecological health. Green Burn had the highest species richness of the three, probably due to its larger size. All three supported a diverse assemblage of stoneflies including the LBAP species *Brachyptera putata*, and a suite of caddisflies and true flies with varying pollution tolerances. At both Craibstone and Green Burn, the notable true bug *Velia saulii* was recorded, indicating good quality edge habitat.

10.3.157 Bogenjoss Burn was also classified as excellent despite being a small watercourse. It supported a diverse stonefly fauna including *Brachyptera putata* and a variety of other pollution-sensitive, flow-reliant species.

10.3.158 The River Don had a moderately high species-richness with an ASPT score indicating that it was in good ecological health, which was consistent with SEPA's biological assessment of Class A2 'good'. The River Don supports a typical macroinvertebrate assemblage for its size.

10.3.159 Although Goval Burn's species-richness was relatively low compared to other watercourses in the study area, the burn was assessed as being of good ecological health, which was a little higher than its recent SEPA classification of Class B 'fair'. It supported an assemblage numerically dominated by pollution-tolerant species (e.g. *Baetis rhodani*) with a few pollution-sensitive taxa.

10.3.160 Red Moss Burn was classified as fair and this was mainly due to its low species-richness and its assemblage being dominated by pollution-tolerant species such as the blackfly (*Simulidae* family) and the stonefly (*Nemoura* sp.).

10.3.161 Blackdog Burn was classified as being in good ecological health and this is consistent with SEPA's own biological monitoring results; classified as Class A2 'good'. For a small watercourse, it had a high species richness and a fauna comprising a range of pollution-sensitive, flow-reliant species, particularly stoneflies.

Overall Summary of Baseline Conditions

10.3.162 In the predominantly agricultural habitat present within the study corridor, there is a relatively small amount of semi-natural habitat. Coniferous plantation woodland is the dominant land use after agriculture, with areas of mixed plantation and scrub recorded frequently. There are small patches of semi-natural and wet woodland usually dominated by birch and rowan, and outcrops of semi-improved acid grassland occasionally interspersed with dry heath. There are small isolated areas

of marshy grassland, the most extensive of which surround Corby and Lily Loch, which support a small area of nutrient-poor fen. Red Moss and the area to its west support dry and wet modified bog and semi-natural woodland in the form of birch and willow carrs.

10.3.163 This largely agricultural landscape does however, support a wide range of species. Badgers and roe deer are common and found throughout the study area. Otter activity is generally concentrated along the River Don and its tributaries, although Goval Burn is also a core area, vital in maintaining the local otter population. Incidental sightings of the generally nocturnal hare were not abundant, but suitable habitat was found. Red squirrels were recorded or reported throughout the study corridor with Kirkhill Forest, Craibstone area and Standingstones Wood being core areas. Daubenton's and pipistrelle bats were found throughout the area with the greatest activity recorded at the River Don. Breeding and wintering bird activity was high at Corby and Lily Lochs.

10.3.164 Frogs were common and recorded throughout the study area, whereas toad and palmate newt were recorded in only a few ponds. No reptiles were found during dedicated searches, although their presence is likely due to habitat suitability. Water vole were absent from the area despite suitable habitat, probably due to the presence of mink throughout the area. Water shrew presence is assumed throughout the area. Mosaic habitats are of greatest potential for terrestrial invertebrate populations. Corby Loch, Goval Wood and the Craibstone complex were all suitable for a number of locally and nationally important species.

10.3.165 The fish habitat surveys recorded the best potential habitat for the greatest number of species at the River Don and Goval Burn, while the freshwater invertebrate sampling concurred with SEPA water quality estimates. Gough, Craibstone, Green Burn and Bogenjoss Burn were recorded as 'excellent' due to the invertebrate communities present.

Evaluation of Baseline Conditions

10.3.166 The ecological value of the baseline conditions described above has been evaluated in accordance with the methods described in Section 10.2 and the geographical framework detailed in Table 10.2. For each of the ecological receptors, the baseline conditions evaluated below are considered for each of the five route sections.

10.3.167 The paragraphs below summarise the ecological value of terrestrial and freshwater habitats and local species populations found in the study area. Full details are provided in Appendices A10.1-A10.16, and a summary is presented in Table 10.9 where evaluations have been summarised and the most significant Habitat Areas for each species presented.

Terrestrial Habitats

Section NL1

10.3.168 Most semi-natural habitats within the Kingswells area are of local ecological value although there are areas surrounding Brimmond Hill, shelterbelt plantations and localised areas of marshy grassland in Kingswells that are of county value.

10.3.169 There are two DWS and SINS in this area: Brimmond Hill and Gough Burn. Brimmond Hill has a mosaic of coniferous plantation and semi-natural broad-leaved woodland, including localised areas of wet woodland and dense gorse scrub with occasional scattered trees. Gough Burn has a mosaic of semi-natural riparian habitats including marshy grassland, wet heath/mire, swamp, wet woodland and scrub. These are assessed as being of regional ecological value.

Section NL2

10.3.170 In Section NL2 there are four Habitat Areas evaluated as being of county ecological value. At Craibstone and at Gough Burn there are areas of semi-mature mixed plantation and semi-natural woodland. These collectively represent a viable area of a priority habitat identified in the NES LBAP.

10.3.171 West Woods is an extensive area of commercial conifer plantation, most of which is located to the west of the study area. The extent and diversity of associated habitats confers a county ecological value.

Section NL3

10.3.172 In this section there are ten areas of county ecological value including a large area of farmland with arable, improved and semi-improved grassland, dry stone walls, scattered scrub and species-rich grass verges and hay meadows.

10.3.173 Woodlands in this area of county ecological value are Kirkhill Forest South and Farburn Wood DWS. Kirkhill Forest South is a mature coniferous plantation with a diverse range of semi-natural habitats, including localised areas of broad-leaved woodland, scrub, wet heath and grassland. Farburn Wood is a relatively small area of mature broad-leaved woodland of possibly long established plantation origin.

10.3.174 Areas along Bogenjoss Burn form a mosaic of semi-natural habitats including acid grassland, scrub and marshy grassland. The woodland along Bogenjoss Burn and in the grounds of Pitmedden House comprises semi-natural riparian broad-leaved woodland, and areas of mixed and conifer plantation. This includes viable areas of riparian woodland (LBAP priority), and small areas of parkland with woodland and ornamental species.

10.3.175 Most of Kirkhill Forest lies to the west of the study corridor, with relatively small areas of it relevant to this assessment. The size and diversity of the habitats associated with the combined area of Kirkhill Forest has been evaluated as being of county ecological value.

Section NL4

10.3.176 The River Don has valuable riparian habitats on both banks with additional important freshwater habitats in the river channel. Both banks support species-rich grassland, scattered scrub and tall herb habitats. The semi-natural riparian habitats associated with the River Don represent a viable area of priority habitats identified in the NES LBAP and is considered to be of regional ecological value to the habitat resource.

10.3.177 There are also six Habitat Areas of county value in Section NL4. Goval Belt is a relatively wide shelterbelt of broad-leaved woodland, dominated by mature birch and rowan with records of wych elm. This forms an important ecological link between Goval Burn and Goval Wood. Goval Burn, the Mill Lade and Goval reservoir have marginal habitats and wayside trees, and diverse mosaic of habitats: tall herb, grassland, scrub, woodland and semi-improved pasture.

10.3.178 The Formartine and Buchan Way DWS is also evaluated as being of county ecological value as it supports species-rich grassland along its embankments and cuttings with scattered areas of scrub and occasional mature trees. Finally, Skate Wood is a mature birch and rowan woodland with semi-natural characteristics such as widespread natural regeneration and woodland ground flora. This woodland is listed as an Important Local Wildlife Site under the Scottish Wildlife Action Project, and considered to be of county ecological value.

Section NL5

10.3.179 This section has the habitat with the highest ecological evaluation; Lily and Corby Lochs SSSI are of national ecological value. The SSSI includes a diverse range of habitats such as open water, swamp, basin mire (poor-fen vegetation), wet heath, wet woodland, scrub and drainage channels.

10.3.180 The habitats at Red Moss are comprised of mainly wet modified bog habitats with a small area of drier habitat to the north of the site. Scrub and woodland encroachment is occurring around the edge of the bog, with evidence of drainage and cutting, particularly along the south of the bog. However, the bog retains a raised dome structure and forms part of an important network of similar

sites throughout NE Scotland. Lowland raised bog is a UK BAP and NES BAP priority habitat and Red Moss is therefore considered to be of regional ecological value.

10.3.181 Newton of Shielhill DWS is a small wetland area comprising a small waterbody supporting swamp and marginal vegetation, with localised areas of gorse scrub. This area is evaluated as being of county ecological value. There are four other Habitats Areas of county ecological value in this Section, generally semi-natural woodland dominated by birch and rowan.

Badger

10.3.182 Badgers are not generally of conservation concern as they are common and widespread throughout the British Isles and to a lesser extent in Europe. However, there is concern over their potential conflict with man/development and they are a nationally protected species in terms of legislation and recently have been included on the 'Scottish Biodiversity List' under the Nature Conservation (Scotland) Act (2004) as a species considered to be of principal importance for the purpose of biodiversity conservation in Scotland. The potential impact of road schemes on badgers in terms of mortality, displacement, severance, habitat fragmentation and foraging habitat loss, would be considered a breach of current legislation.

10.3.183 Therefore, for animal welfare and conservation reasons badgers are considered to be a nationally important species. Habitats that are necessary to maintain badger populations (i.e. main setts) are evaluated as being of county ecological value. Habitats of good or moderate quality that support badger populations, as identified by social groups and described in Appendix A10.2, but that are not essential to maintain the populations, are evaluated as being of county ecological value whereas those necessary for maintainence of the local population are evaluated as being of regional ecological value.

10.3.184 The following paragraphs contain a summary of the information reported for badgers, for full details refer to Appendix A10.2.

Section NL1

10.3.185 The area offers a limited amount of sett-making habitat comprising Brimmond Hill and occasional shelterbelts and woodland blocks. The areas of woodland are well connected to one another forming an effective wildlife corridor. The predominant land use is pasture, which offers large areas that can be foraged for earthworms. Few alternative foraging habitats are available in areas of scrub and woodland. There is little arable land to offer seasonal foraging resources through crops.

10.3.186 There are two badger social groups resident in this section (Social Groups NA and NB). These badger groups are likely to occupy large territories that are separate from one another. It is unlikely that further social groups could be supported in this area as there is limited sett habitat and limited alternatives to earthworm foraging habitat.

10.3.187 One main sett (Social Group NB) lies at the edge of the study area, but it is likely that the extent of their habitat use extends throughout the study corridor. Another main sett (Social Group NA) lies 500m to the southwest of the corridor; however, it is likely that their territory extends into the study corridor.

10.3.188 This section is likely to be used predominantly by two social groups and is likely to be of minimal importance to other social groups in the area. Badgers from other social groups may occasionally use the area at certain times of year i.e. male badgers from neighbouring territories during the mating seasons (Spring and Autumn) and during other infrequent visits (for dispersal or to exploit additional foraging resources).

10.3.189 Habitats are of good or moderate quality to support badger populations, with two social groups and are therefore evaluated as being of county ecological value.

Section NL2

10.3.190 This section offers sett-making habitat in woodland on the Craibstone Estate and in other surrounding areas of woodland. However, much of this woodland is likely to suffer from moderate human disturbance. The predominant agricultural land use comprises of pasture with a golf course also present. Both of these offer large areas that can be foraged for earthworms. Alternative seasonal foraging habitats include areas of woodland and arable land.

10.3.191 The A96, at the northern boundary of this section, acts as a barrier to limit the extent of potential badger territories. It also increases the mortality of badgers and reduces badger movements into or out of this area. The Craibstone Underpass offers a safe crossing point across the A96. This facilitates movements of badgers north and south of the A96 thereby allowing dispersal and other genetic interaction between otherwise genetically isolated badger sub-populations.

10.3.192 There is only one badger social group resident in this section (Social Group NC) and it is unlikely that further social groups could be supported in this area due to the low carrying capacity caused by human disturbance and the proximity of the A96.

10.3.193 Social Group NC's main sett lies within this section and is likely to be used only by this social group. Badgers from other social groups may occasionally use the area at certain times of year i.e. male badgers from neighbouring territories during the mating seasons (Spring and Autumn) and during other infrequent visits (for dispersal or to exploit additional foraging resources).

10.3.194 In this section of the route, habitats are of good or moderate quality to support badger populations, with one social group present and are therefore evaluated as being of county ecological value.

Section NL3

10.3.195 This section offers large areas of high quality sett-making habitat within Kirkhill Forest, in other local woodland blocks and in areas of gorse and bracken. Kirkhill Forest offers vegetative cover around setts, and sloping ground into which setts can be dug. Owing to its large size, denseness of trees and few footpaths, it suffers little human disturbance. Consequently, Kirkhill Forest is considered to provide high quality habitat for social groups in this section (Table 6, Appendix A10.2).

10.3.196 Foraging habitat is offered within Kirkhill Forest itself, other woodland blocks and in surrounding pasture fields. These provide year-round foraging opportunities for badgers. The pasture land adjacent to Kirkhill Forest is considered to provide high quality habitat for social groups (Table 6, Appendix A10.2). This is because of there being no other suitable earthworm foraging habitat adjacent to the territories of social groups ND, NE, NF and NG.

10.3.197 The A96 acts as a barrier to limit the extent of potential badger territories in the south of this section, increases risk of mortality and reduces badger movements into or out of the south of this area. The Craibstone Underpass offers a safe crossing point across the A96 for badgers in the south of this section. This facilitates movements of badgers north and south of the A96 thereby allowing dispersal of juveniles and other genetic interaction between otherwise genetically isolated badger sub-populations.

10.3.198 There are at least five badger social groups resident in this section (Social Groups ND, NE, NF, NG and NH) representing the highest density of badger groups within the Northern Leg study area. These social groups are in close proximity to one another and it is unlikely that further social groups could be supported in this area. This high density of badger groups is related to the high quality badger habitat in terms of foraging and sett-making opportunities.

10.3.199 Kirkhill Forest and the surrounding woodland blocks are well linked, providing a wildlife corridor along which badgers can move safely around their territories and into other groups' territories allowing dispersal and genetic mixing. The area is likely to be used predominantly by four social groups. Badgers from other social groups may occasionally use the area at certain times of year

i.e. male badgers from neighbouring territories during the mating seasons (Spring and Autumn) and during other infrequent visits (for dispersal or to exploit additional foraging resources).

10.3.200 In this section, habitats are considered vital to maintain badger populations rather than support existing populations, and are therefore evaluated as being of regional ecological value. These habitats support high densities of social groups and individual badgers (based on the size of the setts) and are considered essential to maintain the status of the badger population in this area of NE Scotland.

Section NL4

10.3.201 This section offers sett-making habitat on both sides of the River Don. West of the Don, limited sett-making habitat is offered in the disused sand and gravel quarry, in adjoining scrub and along the banks of the River Don. East of the Don, setting habitat is offered in the occasional, scattered, small blocks of woodland and along the banks of the River Don and Goval Burn. However, riverside sett habitat is prone to flooding and disturbance by members of the public.

10.3.202 The pasture of the River Don flood plain offers high quality foraging habitat throughout this section. Alternative foraging habitat is offered in occasional arable fields. The River Don acts as a barrier preventing movements of badgers from one side of the river to the other and also limits the extent of potential badger territories. The vegetated banks of the River Don and Goval Burn provide wildlife corridors along which badgers can commute.

10.3.203 There are four badger social groups resident in this section (Social Groups NI, NJ, NK and NL). These four social groups represent a significant population of badgers. This relatively high density of badgers is likely to be because of the high quality foraging habitat available in this area.

10.3.204 The area is likely to be used by the resident badger groups and other unidentified social groups outside of the study area. Badgers from other social groups may occasionally enter the area at certain times of year i.e. male badgers during the mating seasons (Spring and Autumn) and during other infrequent visits (for dispersal or to exploit additional foraging resources).

10.3.205 In this section, habitats are of good or moderate quality and support badger populations, with one social group present. This section is therefore evaluated as being of county ecological value.

Section NL5

10.3.206 This section offers a limited amount of setting habitat comprising of scrub along Blackdog Burn and in occasional shelter belts. The predominant land use comprises of pasture, arable and scattered scrub. Soils in the area are likely to be thin and consequently only moderately productive in terms of earthworms. Alternative foraging is offered by scrub and arable land.

10.3.207 Blackdog Burn was assessed as being of high importance to Social Group NO (Table 6, Appendix A10.2). This is because the woodland and gorse scrub that adjoin the burn, offer the only suitable setting habitat in Social Group NO's territory, it also offers alternative foraging habitat and provides a safe commuting corridor. The A90 acts as a barrier to limit the extent of potential badger territories at the east of this section, increases badgers' risk of mortality and reduces badger movements into or out of the area.

10.3.208 There are four social groups resident in this section (Social Groups NL, NM, NN and NO). These social groups occupy large territories and are unlikely to exhibit territorial defence. Although this section is large, it is unlikely that further social groups could be supported in this area on account of the limited available sett habitat and suboptimal foraging habitat.

10.3.209 Two main setts are recorded within this section (those of Social Groups NM and NO). The main setts of Social Groups NL and NN lie outside of this section.

10.3.210 This section is likely to be used predominantly by four social groups and is likely to be of minimal importance to other social groups in the area. Badgers from other social groups may occasionally use the area at certain times of year i.e. male badgers from neighbouring territories during the mating seasons (Spring and Autumn) and during other infrequent visits (for dispersal or to exploit additional foraging resources).

10.3.211 Habitats are of good or moderate quality to support badger populations, and therefore this section is evaluated as being of county ecological value.

Bats

10.3.212 The sites necessary to maintain the viability of populations in the Aberdeen area, such as roost sites, are evaluated as being of regional importance to nature conservation, due to the international importance of bat species. Sites deemed to be supporting bat populations, such as important foraging habitat or commuting corridors, are evaluated as being of county ecological value. Sites with potential to support bat populations are considered to appreciably enrich the habitat resource within the local context and are evaluated as being of local ecological value. The following paragraphs contain a summary of the information reported for bats; for full details refer to Appendix A10.3.

Section NL1

10.3.213 Of the seven Habitat Areas in this section, one is assessed as being of regional value due to the presence of an anecdotal roost at Newton Farm. Four are assessed as being of county ecological value due to their role in supporting foraging and commuting bats. These Habitat Areas are likely to be of strategic importance to bats by providing foraging opportunities and linear features between Kingswells and the Craibstone estate. Two Habitat Areas have been assessed as being of less than local ecological value as bats were not observed using these areas (which are exposed and provide limited resources suitable for foraging, commuting or roosting).

Section NL2

10.3.214 Of the 11 Habitat Areas within this section, one is evaluated as being of less than local ecological value, two of local ecological value and eight of county ecological value. No features were evaluated as being of higher importance due to the absence of roosts and the low numbers of bats recorded using these Habitat Areas.

10.3.215 This section has important green corridors such as the SAC Craibstone Estate, which are strategically situated between roosting opportunities in Aberdeen and foraging opportunities and shelter at Kirkhill Forest to the west. Craibstone Estate also provides habitat considered to be of high ecological value to bats.

Section NL3

10.3.216 Of the 20 Habitat Areas in this Section, two are considered to be of less than local ecological value, five of local ecological value, 12 of county ecological value and one of regional ecological value. These evaluations reflect the presence of roosts at Walton Farm and Sunnybrae, and the presence of small numbers of bats foraging and commuting around parts of Kirkhill Forest.

Section NL4

10.3.217 Of the 22 Habitat Areas in this section, two are considered to be of less than local ecological value, seven of local ecological value, 11 of county ecological value, one of regional ecological value (due to presence of roosts) and one of national ecological value (due to commuting and foraging potential of the River Don).

10.3.218 The relatively high proportion of Habitat Areas of county ecological value or above is a reflection of the fact that bats have been observed using many of the features within this section, in particular

those to the east of the River Don. The River Don and Goval Burn are excellent foraging and commuting habitats. Habitats maintain regularly occurring, regionally important numbers of internationally important species of bats including Daubenton's and pipistrelles. Good connectivity between features in the landscape including via Goval Belt and the Formartine and Buchan Way ensure that foraging and roosting resources are accessible to bats.

Section NL5

10.3.219 Of the 25 Habitat Areas in this section, four are considered to be of less than local ecological value, five of local ecological value, 15 of county ecological value and one (a historic roost) of regional ecological value. Although areas of high value habitat in this section (including Red Moss, shelterbelts at Cranfield and the Lochs) are separated by low value agricultural land with high exposure levels and little shelter, many bats were observed using these resources, which reflects the importance of maintaining green corridors including those between Littlejohn's Wood and features in the Monument Wood.

Breeding Birds

10.3.220 This summary combines the data from both SOV and quadrat surveys and identifies broader areas that are valuable to bird species.

Section NL1

10.3.221 This section comprises an intensively farmed agricultural landscape consisting of improved and semi-improved grassland fields, with some areas of scrub at the foot of Brimmond Hill. Although, no SOVs were identified, two county value Habitat Areas were identified in this area; Brimmond Hill (N9) and Gough Burn SINS and DWS (N14). Brimmond Hill comprises a mosaic of coniferous plantation and semi-natural broad-leaved woodland, including localised areas of wet woodland and dense gorse scrub with occasional scattered trees. Gough Burn comprises a mosaic of semi-natural riparian habitats including marshy grassland, wet heath/mire, swamp, wet woodland and scrub.

Section NL2

10.3.222 Three areas of county value were identified in this section; Craibstone Campus (N25), Craibstone Burn and Pond (N26) and Green Burn (N27). Habitats within the areas had a mixture of semi-natural broad-leaved and coniferous woodland and plantation that includes non-native tree species. A record of a WCA (1981) Schedule 1i bird species (barn owl) was supplied by NESBReC. JNCC Red and Amber listed species were additionally present and the habitat includes woodland and riparian habitat.

Section NL3

10.3.223 In this section there are two areas evaluated as being of county ecological value; agricultural land surrounding Howemoss (N32 and N33) and woodland/riparian habitats comprising Kirkhill Forest, Bogenjoss Burn/Monument Wood and East Woodlands (N37, N41, N42, N43 and N45).

10.3.224 Agricultural land surrounding Howemoss comprises a large area of farmland with arable, improved and semi-improved grassland, scattered scrub and species-rich grass verges and hay meadows. Kirkhill Forest and East Woodlands consists of mature coniferous plantation with a diverse range of semi-natural habitats, including localised areas of broad-leaved woodland, scrub, wet heath and grassland. Bogenjoss Burn/Monument Wood, in comparison to both, comprises semi-natural riparian broad-leaved and mixed / conifer plantation woodland with a mosaic of scrub, heath and acid grassland.

Section NL4

10.3.225 In this section there are six Habitat Areas evaluated as being of county ecological value; the River Don DWS (N52), Woodland around Goval House (N53), Goval Wood and Plantation (N56 and N57), Goval Burn and Mill Lade (N61) and Parkhill Estate (N63). Habitats represented by the five areas ranged from riparian grassland / wet woodland habitats (River Don and Goval Burn/Mill Lade) to semi-natural broad-leaved woodland and mature beech plantation interspersed by improved 'cattle grazed' grassland fields (Woodland around Goval House and Parkhill Estate). Whooper swan (a WCA (1981) Schedule 1i species) was recorded as an incidental on the River Don.

Section NL5

10.3.226 Five Habitat Areas of county ecological value were identified: Littlejohn's Wood (N72), agricultural fields to south of Lochgreens Farm and between Lochgreens road / gravel pit (N84 and N87), Newton of Shielhill DWS (N88), Backhill of Cranbog (N63) and Blackdog (N93). One site of regional ecological value was also identified (Corby and Lily Lochs SSSI, DWS, SINS (N85).

10.3.227 Habitats of ecological value ranged from conifer and regenerating birch woodland (Littlejohn's Wood), scrub and swamp/marginal habitats (Newton of Sheildhill) to agricultural fields of arable, improved and marshy grassland with small copses of broad-leaved and coniferous plantation woodland with areas of scattered scrub and bracken (represented by the remaining four Habitat Areas). Barn owl and red-backed shrike (*Lanius collurio*) (WCA (1981) Schedule 1i species) were recorded in the area of Backhill of Cranbog.

10.3.228 Corby and Lily Lochs comprises a diverse mosaic of habitats including open water, swamp, basin mire, wet heath, wet woodland, scrub and drainage channels. Two WCA (1981) Schedule 1i bird species (red-throated diver and scaup; recorded as an incidental) were recorded on Corby Loch.

Wintering Birds

10.3.229 The following evaluation took account of the status of the assemblage of species found in each quadrat or WOV to determine an overall ecological value for each Habitat Area. Where more than one quadrat was evaluated within a Habitat Area the highest evaluation is presented in the summary table (Table 10.9). Full details of results and evaluation can be found in Appendix A10.4.

10.3.230 The majority of the wintering bird quadrats and the breeding bird quadrats did not overlap, but many were adjacent and some did overlap in Section NL3. This summary evaluates the data from both the WOV, quadrat surveys and incidental observations and identifies broader areas that are valuable to bird species and provides a combined evaluation for the wintering bird assemblages in these areas. Habitats that collectively provided shelter and localised foraging opportunities are summarised below.

Section NL1

10.3.231 Seven areas of county ecological value were identified; agricultural fields surrounding Kepplestone Farm (N11, N12, N13 and N14), Gough Burn (N14), Newhills Wood (N16), and agricultural fields and cemetery at Newhills (N17). A WCA (1981) Schedule 1 species (fieldfare, *Turdus pilaris*) was recorded in N12-N14.

Section NL2

10.3.232 Nine areas of county ecological value were identified; agricultural fields (N18 and N20), Craibstone Golf Course (N19), woodland along Gough Burn and Parkhead Wood (N21 and N24), woodland and farmland north of Parkhead Wood (N23) and at Craibstone SAC (N25, N26 and N28). WCA (1981) Schedule 1 species (fieldfare and redwing, *Turdus iliacus*) were recorded in N26 and N28.

Section NL3

10.3.233 Ten areas of county ecological value were identified; agricultural land and woodland between A96 and Dyce Drive and surrounding Howieburn (N30, N31, N32, N33 and N39), woodland at Kirkhill (N34, N35, N37 and N40) and Bogenjoss Burn (N38). Eight areas of regional ecological value were identified; agricultural fields to the northeast of Kirkhill Forest (N41, N44, N46 and N48), Bogenjoss Burn (N42), East Woodlands, Monument Wood and woodland around Pitmedden House (N43, N45 and N47). WCA (1981) Schedule1i species (fieldfare) was recorded in N32/N33. Fieldfare and redwing (also a WCA (1981) Schedule1i species) were recorded in N30, N37, N38 & 39.

Section NL4

10.3.234 Ten areas of county ecological value and nine areas of regional value were identified in this section. County value sites included; agricultural fields in the Goval area (N55, N60, N64 and N59), Formartine and Buchan Way (N62), Goval Belt and Goval Burn and Lade (N58 and N61), Park Hill Estate (N63), agricultural fields North of Meadowhead Burn and East of Formartine and Buchan Way and Meadowhead Burn (N69 and N73). Regional value sites included; farmland surrounding the River Don and DWS (N49, N50, N51, N52 and N54), agricultural fields to the east and south east of Goval Burn/Mill Lade (N68, N69 and N70) and Den Wood and plantations (N67). WCA1i species (fieldfare and whooper swan) and Birds Directive Annex I species (smew, *Mergellus albellus*) recorded in N52 (River Don). WCA1i Schedule 1 species (fieldfare and redwing) were recorded in N55, N60, N62 and N64. Fieldfare was recorded in N50, N51, N52, N59 and N73.

Section NL5

10.3.235 One area of national, 12 areas of regional, and four areas of county ecological value were identified in this section. National value sites included Corby / Lily Loch SSSI (N85). Regional value sites included; woodland at Red Moss (N74), agricultural areas around Lochgreens Farm (N80, N81, N83, N84, N86 & N87), Backhill of Cranbog (N86 and N87) and Fifehill (N94, N96 & N97). County value sites included agricultural areas around Backhill of Cranbog (N88, N89, N90 and N93).

10.3.236 Habitats comprised areas of mature semi-natural broad-leaved woodland, plantation coniferous woodland, running and standing water, heathland, acid grassland and agriculatural land. Birds Directive Annex I species (smew, pink-footed goose; *Anser brachyrhynchus*, and greylag goose, *Anser anser*) were recorded in N85. Greylag geese were present in nationally important over-wintering numbers. Pink-footed goose was also recorded in N90. WCA (1981) Schedule 1i species (fieldfare and redwing) were recorded in N87 and N90 with merlin (*Falco columbarius)* also a WCA (1981) Schedule 1 species recorded in N94, N96 and N97.

Otter

10.3.237 The otter is a species of international conservation importance due to its inclusion in Annex IV and Annex II of the Habitats Directive. It is also a priority species in the UK BAP. However, the otter is not threatened or rare in the region or county, and is not an NES LBAP priority species. The Aberdeen area maintains populations of an internationally important species and therefore local otter populations are assessed as being of national ecological value.

10.3.238 The following paragraphs contain a summary of the information reported for otter, for full details of which are provided in Appendix A10.6.

Section NL1

10.3.239 Kepplehill Burn supports otter populations through functioning as a potentially important commuting route between the River Dee and River Don catchments although low fish populations mean that the burn is not vital to the maintenance of the population and is of county ecological value.

Section NL2

10.3.240 The Gough Burn, Craibstone Burn and Green Burn all maintain the local otter population through fish stocks and high value habitat. Locally important woodland including Gough Burn DWS, Craibstone, Parkhead and Chapel Croft Woods along the reaches of these burns provides important undisturbed cover and potential lying-up sites. These are of regional ecological value. Craibstone Pond may occasionally be used for foraging and is of county ecological value.

Section NL3

10.3.241 Bogenjoss Burn is the only major watercourse in this section, and is of regional ecological value for otters. The burn is a tributary of the River Don and flows through marshy grassland, scrub and semi-natural riparian broad-leaved woodland that forms a viable area of priority LBAP habitat of county ecological value. The remaining watercourses are all minor features, but the fact that they may be used as commuting routes means that they are also of county ecological value.

Section NL4

10.3.242 The Goval Burn is a core area of otter activity and of national ecological value. Otter signs are abundant and include many lying-up sites and potential breeding areas, with other habitats supporting the local population at the Mill Lade and Parkhill Loch are of regional and Corsehill Burn is of ecological value. Large fish populations in the River Don are vital to the maintenance of the species in this area.

Section NL5

10.3.243 This section contains a number of important water features and terrestrial Habitat Areas. The fish stocks in Corby and Lily Lochs provide habitat of national ecological value, while the high value habitat and fish stocks at Blackdog Burn are of regional ecological value. Red Moss and Blackdog Ditch are of county ecological value.

Red Squirrel

10.3.244 Red squirrel is considered to be a species of national conservation concern and is threatened throughout Scotland. Habitats supporting populations of red squirrels in the Aberdeen area are therefore assessed as being of regional ecological value, as regularly occurring, locally significant populations of a species that occur in a regional and UK BAP.

10.3.245 Habitats maintaining locally significant populations are evaluated as being of national ecological value. Habitats not currently supporting red squirrel, but considered to appreciably enrich the habitat resource within the local context are evaluated as being of local ecological value. The following paragraphs contain a summary of the information reported for red squirrel; for full details refer to Appendix A10.7.

Section NL1

10.3.246 No suitable habitats for red squirrel were identified in this section.

Section NL2

10.3.247 Although woodland area Newhills South (W9, 4ha) is contiguous to the mature Scot's pine plantation of woodland area Newhills North (W1, 4ha), where red squirrels are present, the lack of foraging opportunities in this small dense semi-mature sitka spruce plantation may explain the lack of positive survey data for squirrel in this woodland. Overall, Newhills South is considered to be of local ecological value. Also it may be the case that red squirrels found in woodland W1 travel to and from woodland W2 as the two woodlands are less than 150m apart and are connected by a hedgerow; potentially serving as a commuting corridor. Due to the presence of red squirrels, woodlands W1 and W2 are considered to be of regional ecological value to red squirrels.

10.3.248 There are several woodlands in close proximity in these areas. Red squirrels found in the woodland areas Craibstone North (W3), Parkhead Wood (W4) and West Woods (W10) are likely to be utilising the entire habitat of these woodlands, over an area of approximately 100ha, less than 1km south of the A96 trunk road. Although part of W3 is an arboretum of labelled, mainly exotic trees, planted by the Forestry Department of the University of Aberdeen, the tree species mixture and varied age structure in W2 and W3 has probably contributed to the presence of red squirrels in this area.

10.3.249 The fact that the above woodlands are managed to create an open canopy, with a range of different tree species and ages makes this an important area for red squirrel conservation. Grey squirrels found in this area are likely to have moved west from the city of Aberdeen and are generally controlled by local gamekeepers or by the Forestry Commission (Mr Gavin Legge, pers comm.).

Section NL3

10.3.250 Woodland areas Kirkhill Forest North (W5), East Woodlands (W6), Kirkhill Forest South (W11), and Standingstones Wood (W12) all form part of, or are contiguous with, Kirkhill Forest, an area of conifer forest of over 400ha. It is likely that there is a stable red squirrel population in this area, where grey squirrels have not yet penetrated. Due to the size of the woodland, age and mixture of tree species present, these woodland areas are considered to be a core reserve for and of national importance to red squirrels and therefore of national ecological value.

10.3.251 Monument Wood (W7, 10ha) is a mature Scot's pine plantation where red squirrels are present. As noted previously, red squirrels have been seen moving between this wood and East Woodlands (W6) dreys have been observed. Coniferous trees are the most suitable for building dreys, and they provide high-energy food nearly all year (Corbet and Southern, 1977; Wauters and Dhondt, 1987 in Verboom and van Apeldoorn, 1990).

Section NL4

10.3.252 Goval Wood is a mixed and coniferous plantation, part of a contiguous woodland greater than 100ha. There have been recent sightings of red squirrel (post 2000, NESBReC) and the native tree species are attractive to red squirrels, this woodland is of regional ecological value.

Section NL 5

10.3.253 Littlejohn's Wood (W8) is also contiguous with parts of larger areas of mixed woodland (Corsehill and Red Moss woodlands) and both have tree species that are attractive to red squirrels. There are recent records of red squirrels, this woodland is of regional ecological value.

Water Vole

10.3.254 Due to their national decline, water vole is a species of national conservation concern. West Brimmondside Pond (Section NL1), Craibstone Pond (Section NL2), River Don, Goval Burn (Section NL4) and Blackdog Burn (Section NL5) were all identified as being suitable for water vole. However, no water vole were found despite these areas of suitable habitat being present. This has been attributed to predation by mink in the Aberdeenshire area; water vole have been previously recorded (consultation results and ongoing surveys) and there is therefore the potential for water vole to re-colonise any suitable habitat present. On this basis, moderate or good potential water vole habitat are assessed as being of local ecological value, and sites with poor habitat are assessed as being of no ecological value for water vole. Full details are presented in Table 10.9.

Amphibians

10.3.255 Standing water is the least common habitat type in Aberdeen, covering just 37ha (Aberdeen City Council, 1994). Due to the scarcity of standing water within the local area, the importance of any waterbody considered suitable to support a viable population of amphibians is evaluated as being

of local ecological value. Waterbodies that did not contain amphibians or are considered not capable of supporting a viable population of amphibians are evaluated as being of less than local ecological value. Where waterbodies are in close proximity to each other and are considered to support amphibian populations that are present in nearby ponds, this is considered to enhance the biodiversity resource to county ecological value.

10.3.256 No great crested newts were recorded during the survey. Frogs were present throughout the study area whereas toads and palmate newt were recorded in Craibstone Pond (Section NL2) at Gravel Pit Pond II (Section NL3) and at Loch Hills Farm (Section NL5). For all sections except Section NL4 (less than local ecological value), the study area was evaluated as being of local ecological value to amphibians.

Brown Hare

10.3.257 Brown hare is a UK BAP and NES LBAP species due to general decline caused by changes in farming practices and hunting, and therefore considered to be of county ecological value. Any high value habitat that has the potential to support substantial populations has been evaluated as being of county ecological value. Habitat that is of medium or low quality, but that has the potential to support a small population has been assessed as being of local ecological value.

10.3.258 Brown hare have been sighted throughout the study area and activity levels were highest in Section NL3, which has been assessed as being of county ecological value due to the suitability of the habitat; a mixture of arable and improved fields with appropriate areas of shelter.

Deer

10.3.259 Roe deer were found throughout the study area and activity levels were highest in Section NL3, which is the most wooded section and includes Kirkhill Forest. Roe deer populations in the Aberdeen area are not considered to be of conservation importance and are of less than local ecological value, and have therefore not been ecologically evaluated. However, they are considered in terms of risk of RTAs and the consequences for road safety and animal welfare in Appendix A10.11.

Reptiles

10.3.261 Although surveying did not provide any records of reptiles, common lizards and adders are known to be present near or within the study area. Therefore, it has been assumed that common lizard and adder are present in low frequency and abundance in all high quality suitable habitat within the study area.

10.3.262 Adder and common lizard are not species of conservation concern. However, due to general decline in suitable reptile habitat these species are evaluated as being of local ecological value. Therefore sites with high quality habitat or well-connected areas of moderate quality habitat capable of supporting reptile populations are assessed as being of local ecological value, and sites with low value habitat or isolated patches of moderate value habitat are assessed as being of less than local ecological value for reptiles.

10.3.263 Sections NL2, NL3 and NL5 all had a number of suitable habitats with a degree of connectivity that would make them desirable habitat for reptiles of local ecological value.

Terrestrial Invertebrates

10.3.264 A combination of a literature review and habitat assessment was used to evaluate the potential habitat for terrestrial invertebrates. High value habitat is defined as habitat that potentially supports a wide range of species of national and local conservation concern and has been assessed as being of regional ecological value. Habitat of medium value due to size or likely species composition has been assessed as being of county ecological value. Habitat with low value for

terrestrial invertebrates, but that enriches the overall biodiversity of the area has been assessed as being of local or less than local ecological value.

Section NL1

10.3.265 This area of Brimmond Hill comprises mostly dense and scattered gorse scrub and dry heath with scattered birch, rowan and broom throughout. On the lower slopes, there are localised areas of bracken and semi-improved acid grassland. This area is of value to gorse-feeding species, but the density of the scrub will prevent use by many ground-dwelling invertebrates. When in flower the habitat may support Diptera (two-winged flies), Hymenoptera (e.g. bees, wasps) and Lepidoptera (butterflies), and the ground may support one locally important subterranean Aranea species (a spider).

Section NL2

10.3.266 This section comprises a mosaic of wetland habitats comprising rush pasture marshy grassland, willow carr woodland and gorse scrub, with a small section of mire vegetation in the central area of the section. It has the potential to support a range of Diptera, Lepidoptera and Trichoptera (three-winged flies) including two species of national and two of local ecological value.

10.3.267 Craibstone Estate is a large site centred around the SAC buildings, and comprises a number of very different habitats. The habitat of highest value to invertebrates is the mature semi-natural broad-leaved and mixed woodland, which occurs mainly around the outer edges of the estate. Young stands of regenerating aspen are important for several nationally important specialist invertebrates. The arable fields surrounding Craibstone have previously been host to rare Aranae, and the area also has the potential to support a range of Lepidoptera and Hymenoptera. The habitat has the potential to support two species of national and three of local ecological value. There is considerable fragmentation of this habitat due to its use as an agricultural college.

Section NL3

10.3.268 The northern area of Goval Wood presents a mosaic of woodland habitats with predominantly wet semi-natural broad-leaved woodland with localised patches of semi-mature conifer and broad-leaved plantation, and scrub with more open habitats of wet heath and acid grassland. To the south, there is extensive scrub and semi-improved acid grassland. Wet heath will potentially support a range of Lepidoptera, and the mature woodlands Lepidoptera plus a range of Coleoptera, Diptera and Isopoda. The grasslands may support a range of Aranae. Overall, the area has the potential to support two species of national and two of local ecological value.

10.3.269 In the area surrounding Monument Wood, the acid grassland sward and rocky outcrops have the potential to support a range of Aranae, Coleoptera and Lepidoptera. The habitat has the potential to support two species of national and one species of local ecological value.

Section NL4

10.3.270 The young broad-leaved woodland is not yet of value to terrestrial invertebrates, but the acid grassland sward has the potential to support a range of Aranae, Coleoptera, Hymenoptera and Lepidoptera. However, the area is very small and surrounded by improved agricultural fields.

10.3.271 The semi-improved grassland and riparian vegetation may support a range of Aranea, Coleoptera, Hymenoptera, Lepidoptera and Trichoptera. One species was identified as of national and two of local ecological value.

10.3.272 A small area of mixed plantation woodland supports semi-mature mixed trees with a poor ground flora. Due to the age structure and plantation nature of the woodland, this area is likely to be of limited interest to terrestrial invertebrates. It may support a range of Aranae and Coleoptera, but none of the locally important species are likely to be present.

Section NL5

10.3.273 This broad-leaved and semi-natural plantation woodland supports a combination of regenerating birch woodland and acid grassland/heath mosaic with dry stone walls. It has the potential to support a range of Aranae, Coleoptera, Gastropoda, Hymenoptera and Lepidoptera including two species of national importance and four of local importance. The area is a reasonable size and links the area of woodland to the north and Red Moss.

10.3.274 In addition to Corby Loch, there are a range of wetland habitats present, such as willow scrub and marshy grassland. This habitat will potentially support a range of Diptera, Hymenoptera, Lepidoptera, and Odonata (dragonflies and damselflies). This includes two Lepidoptera of national and three of local ecological value.

10.3.275 The marshy grassland has the potential to support a range of Diptera, Hymenoptera and Lepidoptera, with the small pond having the potential to support Odonata. This area has the potential to support two species of national and one of local ecological value. However, this is a very small area surrounded by improved fields.

10.3.276 The poor semi-improved neutral sward and the areas of marshy grassland and scrub in this section have the potential to support a range of Aranae, Coleoptera and Lepidoptera. Two species of national and one of local ecological value are likely to be present. This area is small although the marshy grassland may provide links to the larger area of marshy grassland to the north.

10.3.277 Red Moss is a largely dry modified bog with heather dominated areas and much birch and willow scrub. There are localised areas with dry modified bog habitat with well-drained, leggy heather-dominated vegetation. The area has been greatly affected by human disturbance due to drainage and peat extraction. The heath areas are known to support locally important Lepidoptera and have the potential to support a range of Aranea and Coleoptera. There is potential to support two species of national and four of local ecological value.

Water shrew

10.3.278 Although surveying did not provide any records of water shrew, they are known to be present in the area and there is good potential water shrew habitat within the route corridor. Water shrew are common and widespread and are not considered to be a species of conservation concern.

10.3.279 HABSCORE assessment results referred to below are provided in Table 10 of Appendix A10.15 (Fish).

Fish

10.3.280 Atlantic salmon are widespread in Scotland, but in severe decline and scarce in the rest of the UK and are assessed as being of national ecological value if confirmed present. Sites likely to support local populations of sea, river and brook lamprey in the North East of Scotland are evaluated as being of county ecological value, and habitats that possibly maintain a population are assessed as being of local ecological value. All other fish species present are very common in the UK and of less than local ecological value. Habitat value at the proposed crossing points was evaluated and has been described below.

Section NL1

10.3.281 Kepplehill Burn is very small and has been extensively modified, straightened and culverted under the existing road. The burn has a relatively shallow gradient, low flow, and the substrate matrix comprises gravel/coarse sand, fine sand/silt. It also has areas of overhanging vegetation, and has been graded good (SEPA Classification A2) on the basis of its invertebrate fauna and water quality, but the channel may dry during the summer, reducing the use of the tributary for salmonid spawning and juveniles. At other times brown trout, eels and brook lamprey are the most likely fish species to utilise the habitats present (DonDSFB). The results of the HABSCORE assessment

indicate that Kepplehill Burn survey area provides habitat for juvenile trout. These factors combine to give the Kepplehill Burn local value.

Section NL2

10.3.282 Gough Burn is medium-sized (0.8-1.5 m wide and <0.3m deep) and extensively modified with a moderate gradient and moderate flow. It also has several areas of coarse woody debris (CWD), which have created pool and riffle sequences, large boulders, undercut banks and overhanging vegetation. The invertebrate fauna and water quality indicates that the watercourse is in excellent condition (SEPA Classification A1). Brown trout, brook lamprey, and eels are the most likely fish species to utilise the habitats present (DonDSFB).

10.3.283 Craibstone Burn is a small, shallow burn (<1m wide) with a relatively shallow gradient and moderate flow. It also has several areas of undercut banks and overhanging vegetation. Brown trout, brook lamprey, and eels are the most likely fish species to utilise the habitats present (Don DSFB). The burn has been modified in places but the invertebrate fauna and water quality indicate that the watercourse is in excellent condition (SEPA Classification A1).

10.3.284 Green Burn is medium-sized (0.6-1.5m wide and <0.25m deep) and is heavily modified having been extensively straightened and dredged. The gradient and flow is moderate. It also has several areas of submerged vegetation, coarse woody debris, and overhanging vegetation. The invertebrate fauna and water quality of this tributary have been shown to be excellent (A1) and brown trout, sea trout, brook lamprey, and eels are the most likely fish species to utilise the habitats present (Don DSFB).

10.3.285 All three burns have a substrate matrix comprising of large boulders, cobbles, gravel/coarse sand and fine sand/silt.

10.3.286 The results of the HABSCORE assessment indicate that the survey areas of the Gough and Craibstone Burns provide suitable habitat for juvenile trout and that the survey area of the Green Burn provides suitable habitat for juvenile salmon and trout.

10.3.287 All three burns have been assessed on these criteria as being of county value for their fish populations.

Section NL3

10.3.288 This section of the route crosses the Bogenjoss Burn system, located in Kirkhill woodland, at two locations along its length. Bogenjoss Burn (site a, downstream) is a medium sized tributary of the River Don (variable width and <0.3m deep) with a quick flow, and a substrate matrix comprising of large boulders, cobbles, gravel/coarse sand, and fine sand/silt. At site b (upstream, at Kirkhill Forest) the burn is a lot smaller (width and depth 0.3m) with low flow and a substrate matrix comprising gravel/coarse sand, and fine sand/silt. At both sites the gradient is steep and there are areas of CWD and overhanging vegetation. Brown trout, brook lamprey, and eels are the most likely fish species to utilise the habitats present at the upstream and brown trout and eels at the downstream site (Don DSFB).

10.3.289 The results of the HABSCORE assessment indicate that the survey areas of the Bogenjoss Burn provide suitable habitat for juvenile trout. Bogenjoss Burn is considered to be of county value for its fish population.

Section NL4

10.3.290 This section of the preferred route crosses four watercourses, the River Don, Goval Burn and the Mill Lade Aqueduct and the Corsehill Burn.

10.3.291 The River Don has been classified as being of good ecological health (SEPA Classification B) and is considered to be significantly modified. It has considerable value as a salmonid fishery and all

three species of lamprey (sea, river and brook lamprey) are present. The River Don at the proposed crossing point is a wide (46-55m), deep section of the lower main stem offering a range of habitats, predominantly deep and relatively slow flowing, with some fast-flowing riffles. The gradient is shallow, and the substrate matrix comprises large boulders, cobbles, gravel/sand, and fine sand/silt. Salmonids, lamprey, eel, 3-spined stickleback, perch, pike and minnow are the most likely fish species to utilise the habitats present (DonDSFB). The River Don is assessed as being of national value.

10.3.292 Goval Mill Lade Aqueduct is a canalised, slow flowing, deep, concrete walled channel with silt substrate and extensive macrophyte growth. At the proposed crossing point the channel gradient is shallow, the flow is low, and the substrate matrix comprises bedrock/artificial, and fine sand/silt. It also has areas of overhanging vegetation, and extensive areas of submerged vegetation. Brown trout, brook lamprey, eel, 3-spined stickleback, and minnow are the most likely fish species to utilise the habitats present (DonDSFB). This watercourse offers no spawning habitat for salmonids but small brown trout may be present if they are able to access the mill lade at the upstream end. Mill Lade Aqueduct was evaluated as being of less than local value because it is entirely artificial, has a regulated flow regime, and is unsuitable for salmonids.

10.3.293 Goval Burn is a larger tributary of the River Don (5.6-6.9m wide and <2m deep). At the proposed crossing point the channel is heavily modified and has historically been extensively straightened and dredged. The gradient is relatively shallow with moderate-low flow. It also has areas of submerged and overhanging vegetation. Brown trout, sea trout, brook lamprey and eels are the most likely fish species to utilise the habitats present (DonDSFB), if they are able to ascend the approximately 1.5m high weir. Their potential presence has led to the Goval Burn being evaluated as being of regional value.

10.3.294 Corsehill Burn is a medium sized tributary of the River Don (1.9-5.0m wide and <03m deep). The burn runs through an extensively modified channel adjacent to a side road. At the proposed crossing point the burn has a steep gradient and moderate-low flow Salmonids, lamprey and eel are the most likely fish species to utilise the habitats present (DonDSFB).

10.3.295 The substrate matrix at Goval and Corsehill Burns comprises large boulders, cobbles, gravel/coarse sand and fine sand/silt.

10.3.296 The results of the HABSCORE assessment indicate that the survey areas of the River Don, Goval and Corsehill Burns provide suitable habitat for juvenile salmon and trout. The results of the HABSCORE assessment also indicate that the survey area of the Goval Mill Lade provides suitable habitat for juvenile trout.

Section NL 5

10.3.297 Red Moss Burn is a small sized tributary (1.5-2.5m wide and <0.3m deep), with heavily peat-stained water that runs into Corby Loch (Site of Special Scientific Interest, SSSI) and then on to the sea. At the proposed crossing point the gradient is moderate, the flow is low, and the substrate matrix comprises sparse areas of gravel/coarse sand dominated by areas of fine sand/silt. Areas of submerged vegetation, CWD, undercut banks, and overhanging vegetation may obstruct fish migration downstream of the existing road crossing. Brown trout, brook lamprey, eel, 3-spined stickleback and eel are the most likely fish species to utilise the habitats present (DonDSFB). The results of the HABSCORE assessment indicate that the survey area of the Red Moss Burn provides suitable habitat for juvenile trout. The fish populations of Red Moss Burn have been evaluated as of local value as it provides little in the way of salmonid spawning habitat.

10.3.298 Blackdog Burn runs under the A90 and straight to the sea. At site a, upstream, it is a small sized burn (1.0-2.0m wide and <0.4m deep) At site b, downstream, it is small-medium sized (1.5-2.5m wide and <0.3m deep). At both sites it has a steep gradient, low flow, and a substrate matrix comprising of large boulders, cobbles, gravel/coarse sand and fine sand/silt, and areas of submerged vegetation, CWD, undercut banks, overhanging vegetation, and areas of deep water. The concrete apron at the A90 crossing may represent a barrier to migration. Brown trout, brook lamprey and eel are the most likely fish species to utilise the habitats present (DonDSFB).

10.3.299 The results of the HABSCORE assessment indicate that the survey areas of the Blackdog Burn provide suitable habitat for juvenile trout. The fish populations of Blackdog Burn were evaluated as being of local value on the basis that brook lamprey are likely and that sea trout may be able to gain access under high flows.

10.3.300 The results were determined using species likely to be present data (provided by the DonDSFB), HABform and MAPform survey information and the HABSCORE software program (Table 10 of Appendix A10.15: Fish).

Freshwater Habitats

10.3.301 Information provided by the RHS (degree of modification of a water channel) in addition to its other abiotic (dissolved oxygen) and biotic factors (freshwater invertebrate results) are combined and used to assess its overall value. A summary of the freshwater evaluation information including water vole and water shrew is presented in Table 10.9. The important watercourses surveyed and their associated Habitat Areas are as follows:

- Kepplehill Burn – N11, N12, N13;
- Gough Burn – N14, N15, N17, N18, N24;
- Craibstone Burn – N25, N26, 28;
- Green Burn – N23, N28, N30;
- Bogenjoss Burn – N37, N38, N40, N41, N42, N45;
- River Don – N52;
- Goval Burn – 54, N55, N59, N60, N61;
- Mill Lade Aqueduct – N55;
- Corsehill Burn – N64, N66, N68, N70;
- Red Moss Burn – N82, N83, N84, N85, N86, N87; and
- Blackdog Burn – N91, N93, N94, N95.

10.3.302 All of the watercourses, with the exception of Bogenjoss Burn downstream of the crossing point, were obviously, significantly or severely modified according to RHS scoring. According to the guidelines in the evaluation criteria (Table 10.2) a watercourse that is pristine or semi-natural or obviously modified may be of international or national ecological value. A watercourse that is Significantly modified or above is of regional or county ecological value and a watercourse that is severely modified is of local or less than local ecological value.

Freshwater Invertebrates

10.3.303 The results of the freshwater invertebrate studies are presented in two ways; the BMWP score and the ASPT.

10.3.304 For the BMWP score, organisms are identified to the family level, and each family is allocated a score between 1-10. The most sensitive organisms, such as mayfly nymphs score 10, and the least sensitive, worms score 1. A score of over 100 generally indicates good water quality.

10.3.305 The average sensitivity of the families of the organisms present is determined by the ASPT score and can be determined by dividing the BMWP score by the number of taxa present. A score of over 4 generally indicates good water quality that would be evaluated as regional ecological value.

Section NL1

10.3.306 One burn: Kepplehill Burn is present and the reach of this burn relevant to the assessment is severely modified and comprises a straightened embanked land drain. Keppelhill Burn has been

assessed as being of good ecological value on the basis of the macroinvertebrate communities present.

10.3.307 The freshwater habitat within this section has been collectively evaluated as having local ecological value, based on the assessment of Kepplehill Burn.

Section NL2

10.3.308 Three freshwater habitats were assessed: Gough Burn, Craibstone Burn and Green Burn. The nationally scarce stonefly, *Brachyptera putata* was identified at each of the burns and the notable bug species, *Velia saulii* was identified from Craibstone Burn and Green Burn. The burns within this section are in close proximity and share common freshwater links. The three burns offer a variety of habitats and form a representative sample of the habitat present within the section. The evaluations of each individual burn are discussed below, and have been used to form an overall evaluation of freshwater habitat within the section.

10.3.309 The excellent biological status of each of the watercourses within the section and the presence of nationally scarce and notable species has led to the overall evaluation of freshwater habitat within the section as being of regional value.

10.3.310 Gough Burn is assessed as having excellent ecological value on the basis of macroinvertebrate communities present, despite being significantly modified in the vicinity of the proposed crossing, comprising a straightened channel.

10.3.311 Craibstone Burn also has excellent ecological value, with *B. putata* and *V. saulii* being present. This burn was the least modified out of the three in this section, with the majority of the assessed reach following a natural meandering profile. Evidence of modification was apparent with some bank reinforcement and several minor bridges.

10.3.312 Green Burn is also assessed as having excellent ecological value due to the macroinvertebrate assemblages present. *B. putata* and *V. sualii* are present within the burn, enhancing its value. Although Green Burn is of excellent ecological value, it is significantly modified, with long culverts and bank re-profiling within the vicinity of the proposed route.

Section NL3

10.3.313 The nationally scarce *B. putata* was identified in the vicinity of each of the proposed crossing points. The habitat offered by Bogenjoss Burn varied throughout the assessed reach with the upstream section comprising an obviously modified channel with straightening and bank reinforcement. However, the downstream section offered a complex riparian zone and predominantly unmodified habitat. The variation of habitat offered by the burn and the presence of *B. putata* at both sample locations has resulted in an overall freshwater habitat assessment of regional ecological value.

10.3.314 Both proposed crossing points of the burn were assessed as being of good ecological value for macroinvertebrates and providing habitat for fish and otters due to the complex riparian zone.

Section NL4

10.3.315 River Don, Goval Burn, Mill Lade Aqueduct and Corsehill Burn are identified as having good ecological status based on the macroinvertebrate assemblages present, although the degree of modification varies. All four of these watercourses run in close proximity to each other, and all burns ultimately feed into the River Don.

10.3.316 The River Don is assessed as being of good ecological health, and was identified as being significantly modified due to the bank re-profiling and reinforcement. It has been evaluated as being of national ecological value due to it supporting a salmon fishery and an otter population (see Appendix A10.6: Otter, and Appendix A10.15: Fish).

10.3.317 Goval Burn, the largest of the burns, was found to have good ecological value, despite being severely modified. The burn has reinforced and re-profiled banks and leads into the Mill Lade Aqueduct.

10.3.318 The Mill Lade Aqueduct flows from Goval Burn through the Goval Reservoir and is an artificial watercourse, explaining it identified as severely modified. The aqueduct was identified as having good ecological value based on the macroinvertebrate assemblages present.

10.3.319 Corsehill Burn was found to have good ecological status despite it being a severely modified channel. The assessed reach was an entirely straightened embanked field drain, and as such, the freshwater habitat is evaluated as being of local ecological value.

Section NL5

10.3.320 This section includes two watercourses potentially impacted: Red Moss Burn and Blackdog Burn. The ecological status and degree of modification of these two burns differs. Red Moss Burn is a highly modified land drain whereas Blackdog burn shows some degree of modification.

10.3.321 Red Moss Burn was found to be of fair ecological status and is a small, straightened field drain. It drains into Corby Loch, and due to the SSSI designation of this loch the freshwater habitat has been evaluated as county ecological value.

10.3.322 Blackdog Burn has been identified as having good ecological health based on the macroinvertebrate assemblages identified. The burn is significantly modified with extensive re-profiling and straightening. The freshwater habitat has been evaluated as being of county ecological value because of its size and good ecological health.

Table 10.9 - Summary Evaluation of Key Habitats and Species

Ecological Receptor	Area	Habitat Areas	Features of Interest to Receptor	Evaluation
Section NL1				
Terrestrial Habitats	Scrub and bracken on the slopes of Brimmond Hill	N8	Part of Brimmond Hill DWS, gorse scrub, scattered bracken and occasional scattered birch and rowan.	County
	Woodland at Hillhead of Derbeth	N6	Part of Brimmond Hill DWS, semi-natural broad-leaved woodland, wet woodland and coniferous plantation woodland.	County
	Brimmond Hill (District Wildlife Site [DWS], Sites of Interest to Natural Science [SINS])	N9	Lowland dry heath (UK Biodiversity Action Plan [BAP] Priority Habitat).	Regional
	Gough Burn (DWS)	N14	Mosaic of semi-natural habitats, marshy grassland, wet heath, mire, swamp, wet woodland and scrub. Wet Woodland is a UK BAP Priority Habitat.	Regional
Badgers	Agricultural land to the E of Brimmond Hill	N2, N8 & N13	Supports territory for two social groups of badger (NA and NB) the area supports earthworm foraging and provides green corridors to commute to setting habitat. Group NJ's sett on edge of Section. Limited setting habitat available in this Section.	County
Bats	Netwon Farm	N11	Agricultural land E of Brimmond Hill with one historical roost at Newton Farm.	Regional
	Kepplestone Farm and Kepplehill Burn	N12 & N13	Agricultural Fields supporting foraging habitat with a pond in N13.	County
	Gough Burn	N14	Riparian habitat scrub and wet woodland providing a foraging resource and connecting Habitat Areas.	County
	Newhills Woods	N16	Road providing linear habitat connecting Habitat Areas including Newhills Wood and Craibstone.	County
Breeding Birds	Brimmond Hill	N9	An area of dry heath providing good foraging and breeding opportunities on the upper slopes and summit of Brimmond Hill which constitutes a viable UK Biodiversity Action Plan (UK BAP) priority habitat (lowland heath) and forms part of Brimmond Hill DWS and SINC.	County
	Woodland along Gough Burn (DWS and SINS)	N14	Mosaic of semi-natural habitats providing good foraging and breeding opportunities including marshy grassland, wet heath/mire, swamp, wet woodland and scrub constituting a viable area of a UK BAP priority habitat (wet woodland).	County
Wintering Birds	Agricultural fields surrounding Kepplestone Farm	N11, N12, N13 & N15	Largely improved agricultural fields with dry stone walls and areas of scattered / dense scrub and trees offering shelter and localised foraging opportunities. A pond is present in N13. WCA (1981) Schedule1i species (fieldfare) in N12-N14.	County
	Gough Burn	N14	Mosaic of semi-natural habitats including marshy grassland, wet heath/mire, swamp, wet woodland (a UK BAP priority habitat) and scrub offering shelter and localised foraging opportunities. WCA (1981) Schedule1i species (fieldfare).	County
	Newhills Wood	N16	Commercial coniferous plantation that enhances the local habitat resource offering shelter and localised foraging opportunities.	County
	Agricultural fields and Cemetery at Newhills	N17	Farmland with predominantly arable fields and amenity planting associated with Newhills Cemetery offering localised foraging opportunities.	County
Otters	Kepplehill Burn	N11, N12, N13	No otter signs present, but Kepplehill Burn is likely to be used infrequently as a commuting route between the Dee and the Don catchments.	County
Red Squirrels	n/a		Assessment found no suitable habitat.	N/A
Water vole	West Brimmondside Pond	N6	Good bankside vegetation and banks suitable for water vole burrows. Mink are present.	Local

Ecological Receptor	Area	Habitat Areas	Features of Interest to Receptor	Evaluation
Amphibians	Kingswells	N1	Frog were recorded and there is moderate value habitat for amphibians.	Local
	Kepplestone	N13	Frog were recorded and there is moderate value habitat for amphibians.	Local
	Brimmond Hill and Kepplestone	RPH1 & RPH2, N11 & N13	No reptiles were recorded and there is Low to Moderate habitat value. Habitat that is poorly connected.	Less than Local
Brown Hare	N of Cloghill	N2-N4	Hare sightings in HA N2, arable and improved grassland with shelter in the form of coniferous plantation woodland and scrub.	Local
	Brimmond Hill and Kepplestone	N12-N15 & N17	Hare sightings in N14 and N34, arable and improved grassland with shelter in the form of coniferous plantation woodland and scrub.	Local
Terrestrial Invertebrates	Brimmond Hill and surrounding areas	N6-N8 & N13	Potential to support one locally important species, the dry heath, semi-improved acid grassland and scrub was considered to be of generally low value.	Local
Water shrew	West Brimmondside Pond	N6	Good habitat for water shrew and likely good invertebrate presence, good value habitat.	Less than Local
Fish	Kepplehill Burn	N11 N12 & N13	Extensively modified, straightened and culverted. On the basis of its invertebrate fauna and water quality the burn is SEPA Classification A2, but may dry during the summer, thus reducing the potential to support salmonid spawning and juveniles. At other times brown trout, eels and brook lamprey are the most likely fish species to utilise the habitats present. HABSCORE results indicate that Kepplehill Burn provides suitable habitat for juvenile trout.	Less than Local
Freshwater Habitats	Kepplehill Burn	N11 N12 & N13	Severely modified and comprises a straightened embanked land drain. It is of good ecological status on the basis of the macroinvertebrate communities present.	Local
Section NL2				
Terrestrial Habitats	West Woods	N22	Extensive area of conifer plantation.	County
	Gough Burn and Craibstone Campus	N24 - N26	Riparian habitat including semi-natural broad-leaved and mixed plantation woodland along Gough Burn. Semi-natural woodland is an NES LBAP Priority Habitat.	County
Badgers	Craibstone Campus	N26-N28 & N30	Main sett (Social Group NC) in Craibstone with alternative setting habitat, although subject to disturbance. Supports earthworm foraging and alternatives in woodland and arable land.	County
Bats	Gough Burn	N18 & N24	Riparian habitat with semi-natural broad-leaved woodland supporting foraging and commuting to important roosting opportunities for bats including common pipistrelle.	County
	Craibstone golf course	N19	Not valuable to bats *per se*, but is an important commuting route to more valuable foraging opportunities.	
	Woodland N of Parkhead	N23	Plantation woodland that supports foraging, commuting opportunities.	
	Craibstone Campus	N25	Semi-natural broad-leaved woodland that supports foraging, commuting and roosting opportunities for bats including pipistrelles.	
	Craibstone Burn and Pond	N26	Semi-natural broad-leaved woodland that supports foraging, commuting and roosting.	
	Green Burn	N27	Semi-natural broad-leaved woodland that supports foraging, commuting and roosting.	
	Craibstone Campus	N28	Agricultural land surrounding Craibstone Burn. Supports foraging and commuting for pipistrelles.	
Breeding Birds	Craibstone Campus	N25	Semi-natural broad-leaved and mixed plantation woodland offering good foraging and breeding opportunities surrounding Craibstone SAC. A record of breeding barn owl (a WCA (1981) Schedule 1i species) for this area was supplied by NESBReC.	County
	Craibstone Burn and Pond	N26	Semi-natural broad leaved woodland that supports good foraging and breeding opportunities. A record of breeding barn owl (a WCA (1981) Schedule 1i species) for this area was supplied by NESBReC.	

Ecological Receptor	Area	Habitat Areas	Features of Interest to Receptor	Evaluation
	Green Burn	N27	An area of semi-mature mixed plantation riparian woodland along Green Burn that is of less ecological value than other woodland areas in Craibstone SAC but still provides good foraging and breeding opportunities.	
Wintering Birds	Agricultural fields surrounding Craibstone Campus	N18 & N20	Farmland with improved grassland and riparian habitats adjacent to Gough Burn offering localised foraging opportunities.	County
	Craibstone Golf Course	N19	Extensive area of mown grassland with scattered tree saplings offering localised foraging opportunities.	
	Woodland along Gough Burn and Parkhead wood	N21 & N24	Mature coniferous plantation and semi-mature mixed plantation and broad-leaved woodland offering shelter and localised foraging opportunities.	
	Woodland/Farmland West of C88c, North of Parkhead Wood	N23	Mosaic of farmland and small blocks of plantation woodland providing shelter and localised foraging opportunities.	
	Craibstone Campus	N25	Semi-natural broad-leaved and mixed plantation woodland surrounding Craibstone providing shelter and localised foraging opportunities.	
	Craibstone Burn and Pond	N26	Semi-natural broad-leaved woodland that supports providing shelter and localised foraging opportunities. WCA (1981) Schedule1i species (fieldfare and redwing).	
	Craibstone Campus	N28	Agricultural land surrounding Craibstone Burn that providing shelter and localised foraging opportunities. WCA (1981) Schedule1i species (fieldfare and redwing).	
Otters	Gough Burn, Craibstone Burn and Green Burn	N14, N15, N17, N18, N21, N23-N26, N28, N30	Otters are present at all sites, burns have good fish and eel stocks and there is valuable riparian habitat including woodland and scrub that offers foraging and lying up habitat that maintains local otter populations.	Regional
	Craibstone Pond	N26	No signs present, but Craibstone pond supports the above populations due to the presence of amphibians offering seasonal foraging opportunities.	County
Red Squirrels	Newhills North, Parkhead Woods and West Woods	N16, N21, N22	Red squirrel present, mature coniferous plantation woodland that has optimal foraging and breeding habitat.	Regional
	Craibstone Campus	N24-N26	Red squirrel present, mature semi-natural broad-leaved and mixed plantation woodland along Gough Burn and Craibstone Burn and Pond.	Regional
Water vole	Gough Burn	N14, N15, N17, N18, N24	Poor bankside vegetation and banks unsuitable for water vole burrows. Likely mink presence.	No Value
	Craibstone Burn	N21, N25, N26, N28	Poor bankside vegetation and banks unsuitable for water vole burrows. Likely mink presence.	No Value
	Craibstone Pond	N26	Moderate bankside vegetation and banks suitable for water vole burrows. Likely mink presence.	Local
	Green Burn	N23, N28, N30	Poor bankside vegetation and banks unsuitable for water vole burrows. Likely mink presence.	No Value
Amphibians	Craibstone Pond	N26	High value habitat and palmate newt were recorded in Craibstone pond.	Local
Reptiles	Craibstone	RPH3 & RPH4, N19 and N28	No Reptiles were recorded, Low to Moderate value habitats that were well-connected with each other and areas in Section NL3.	Local
Brown Hare	Craibstone Campus	N18 - N28	Hare sighting at N19, the area surrounding Craibstone has foraging and shelter, but may be unsuitable due to disturbance.	Less than Local

Ecological Receptor	Area	Habitat Areas	Features of Interest to Receptor	Evaluation
Terrestrial Invertebrates	Craibstone Campus and Gough Burn	N18, N24-N26 & N28	Potential to support six locally important species (three are UK BAP species). Gough Burn and Craibstone supports a mosaic of riparian habitats of Medium value to terrestrial invertebrates.	Local
Water shrew	Gough Burn	N14, N15, N17, N18, N24	Good habitat for water shrew and good invertebrate presence, good value habitat.	Less than Local
	Craibstone Burn and Pond	N21, N25, N26, N28	Good habitat for water shrew and anticipated presence of good value invertebrate habitat.	
	Green Burn	N23, N28, N30	Good habitat for water shrew and good invertebrate presence, good value habitat.	
Fish	Gough Burn	N14, N15, N17, N18, N24	Extensively modified, but invertebrate fauna and water quality indicate that the watercourse is in excellent condition (SEPA classification A1). Brown trout, brook lamprey, and eels are the most likely fish species to utilise the habitats present. HABSCORE results indicate that the survey area of Gough Burn provides suitable habitat for juvenile trout.	County
	Craibstone Burn	N21, N25, N26, N28	Small,shallow, and has been modified in places, but the invertebrate fauna and water quality indicate that the watercourse is in excellent condition (SEPA Classification A1). Brown trout, brook lamprey, and eels are the most likely fish species to utilise the habitats present. HABSCORE results indicate that the survey area of Craibstone Burn provides suitable habitat for juvenile trout.	
	Green Burn	N23, N28, N30	Extensively modified by dredging and straightening at the proposed crossing point. The invertebrate fauna and water quality of this tributary have been shown to be excellent (SEPA Classification A1). Brown trout, sea trout, brook lamprey, and eels are the most likely fish species to utilise the habitats present. HABSCORE results indicate that the survey area of Green Burn provides suitable habitat for juvenile salmon and trout.	
Freshwater Habitats	Gough Burn	N14, N15, N17, N18, N24	Excellent ecological value based on macroinvertebrate communities present, although was found to be significantly modified in the vicinity of the proposed crossing, comprising a straightened channel. High ecological value of the habitat and complex mosaic of riparian zones.	Regional
	Craibstone Burn	N21, N25, N26, N28	Excellent ecological value based on macroinvertebrate communities present. The least modified out of the three within this Section, with the majority of the reach following a natural meandering profile. High habitat value.	Regional
	Green Burn	N23, N28, N30	Excellent ecological value on basis of macroinvertebrate communities present. It was significantly modified with long culverts and bank re-profiling within the vicinity of the proposed route, but has High value ecological habitat.	Regional
Section NL3				
Terrestrial Habitats	Agricultural land surrounding Howemoss	N32 and N33	Agricultural land with a network of dry stone walls and species rich hay meadows.	County
	Kirkhill Forest South Standingstones Wood	N35 N37	Mature and young coniferous plantation woodland with areas of broad-leaved woodland, scrub, wet heath and semi-improved acid grassland.	County
	Farburn Wood (DWS)	N36	Mature broad-leaved woodland probably long-established of plantation origin, but with semi-natural characteristic.	County
	Bogenjoss Burn	N37 and N38, N40-N42, N45	Riparian habitat including semi-natural broad-leaved woodlands, marshy grassland and scrub. Riparian woodland is an NES LBAP Priority Habitat.	County
	East Woodlands	N43	Mature coniferous and broad-leaved plantation woodland with open habitat and a line of mature beech trees.	County
Badgers	Kirkhill Forest, Standingstones Wood, East Woodlands, Monument Wood DWS and Bogenjoss Burn	N33-N35,N37, N39, N41-N44 and N45-N47	Four main setts (groups ND,NE,NF and NG and NH one sett, just outside the HA around Kirkhill Forest). Alternative setting habitat available. Foraging and commuting habitat in Kirkhill Wood. Isolated from N/S movements by A96.	Regional

Ecological Receptor	Area	Habitat Areas	Features of Interest to Receptor	Evaluation
Bats	Walton Farm and Sunnybrae Cottage	N30	Two roosts at Walton Farm and Sunnybrae Cottage maintain populations of a county value species (pipistrelles) and have the potential to support regionally significant numbers (ie maternity roost).	Regional
	Agricultural Fields south of Standingstones Wood	N33	Forest edge habitat offers foraging opportunities.	County
	Standingstones Wood	N35	Coniferous plantation woodland with open habitats including dry heath and scrub offering shelter, roosting opportunities and diverse habitat structure.	County
	Farburn Wood (DWS)	N36	Mature broad-leaved woodland, plantation of long established origin that offers foraging and roosting.	County
	Kirkhill Forest North	N37	Coniferous woodland that offers foraging opportunities.	County
	Agricultural Fields around Standingstones Wood	N39	Forest edge and wall network offers linear habitat connecting Habitat Areas.	County
	Agricultural Fields between Lower Overton	N41	There is a derelict building that provides suitable conditions for hibernation in area used by bats.	County
	East Wood	N43	Areas of coniferous and broad-leaved plantation that foraging provide opportunities, the concrete pump house also provides excellent foraging and roosting/hibernating habitat.	County
	Monument Wood	N47	Coniferous plantation that offers foraging and hibernating opportunities.	County
	Bogenjoss Burn	N38, N42 & N45	High value riparian and semi-natural broad-leaved woodland offering excellent foraging and commuting.	County
	Agricultural fields surrounding Bogenjoss Burn	N46	Providing foraging opportunities.	County
Breeding Birds	Agricultural land surrounding Howemoss	N32 & N33	Large area of farmland with arable, improved and semi-improved grassland, dry stone walls, scattered scrub and species-rich grass verges offering scattered/localised foraging and breeding opportunities.	County
	Kirkhill Forest, Bogenjoss Burn / Monument Wood and East Woodlands	N37, N41, N42, N43 & N45	Extensive areas of coniferous and broad-leaved plantation woodlands with some semi-natural broad-leaved woodland and riparian woodland along Bogenjoss Burn offering good foraging and breeding opportunities. Riparian woodland is a NES LBAP Priority Habitat.	County
Wintering Birds	Agricultural land between A96 and Dyce Drive and surrounding Howemoss	N30, N32, N33 & N39	Large area of farmland with arable, improved and semi-improved grassland, dry stone walls, scattered scrub and species-rich grass verges providing localised foraging opportunities. Fieldfare (WCA (1981) Schedule1i species) was recorded (N32/N33) and fieldfare and redwing (WCA (1981) Schedule1i species) was recorded (N30 & 39).	County
	Chapelbrae Wood	N31	Small area of semi-mature broad-leaved woodland plantation providing shelter and localised foraging opportunities.	County
	Standingstones Wood, Kirkhill Forest South, Kirkhill Forest North and Lower Overton Wood	N34, N35, N37 & N40	Mature and young coniferous plantation woodland with areas of broad-leaved woodland, scrub, wet heath and semi-improved acid grassland providing shelter and localised foraging opportunities. Fieldfare and redwing (WCA (1981) Schedule1i species) was recorded (N37).	County
	Bogenjoss Burn	N38	Mosaic of open semi-natural habitats along the course of Bogenjoss Burn including acid grassland, scrub and marshy grassland providing shelter and localised foraging opportunities. Fieldfare and redwing (WCA (1981) Schedule1i species) was recorded.	County
	Agricultural fields surrounding Bogenjoss Burn	N41, N44, N46 & N48	Farmland comprising large arable and improved grassland fields with areas of unimproved acid grassland on steep valley sides and localised areas of scrub and mature trees providing shelter and good foraging opportunities.	Regional
	Bogenjoss Burn (downstream of Kirkhill Forest)	N42	Mosaic of open semi-natural habitats along the course of Bogenjoss Burn including acid grassland, scrub and marshy grassland providing shelter and good foraging opportunities.	

Ecological Receptor	Area	Habitat Areas	Features of Interest to Receptor	Evaluation
Wintering Birds [cont'd]	East Woodlands and Monument Wood	N43 & N47	Area of conifer plantation, with open habitats, broad-leaved woodland plantation and a line of mature beech trees along a former land boundary and commercial conifer woodland with a small area of mature semi-natural pinewood of long-established plantation origin. Both areas provide shelter and localised foraging opportunities.	Regional
	Woodland at Bogenjoss Burn and Pitmedden House grounds	N45	Semi-natural riparian broad-leaved woodland and mixed and conifer plantation providing shelter and localised foraging opportunities.	Regional
Otters	Bogenjoss Burn	N37, N38, N40-N42, N45	Otter present, Bogenjoss Burn is a major watercourse maintaining otter populations in the area due to suitable riparian habitat for foraging and lying up.	Regional
	Howemoss Field Ditch	N33	No signs present, but probably used as a commuting route and therefore supporting the population.	County
	Walton Field Ditch	N30	No signs present, but probably used as a commuting route and therefore supporting the population.	County
	Far Burn	N36 and N39	Otters are present in Far Burn, with suitable habitat for lying up.	County
	Gravel Pit Ponds	N49	No signs of otter, but likely foraging use due to proximity of River Don and the amphibian population present.	County
Red Squirrels	Standingstones Wood, Kirkhill Forest South, North East Woodlands, Bogenjoss Burn	N35, N34 & N37, N43 N42 and N45	Red squirrel present in good numbers. Semi-natural broad-leaved and coniferous plantation woodland. Optimal foraging and breeding habitat (tree species present and age structure) within and contiguous to mature coniferous woodland > 400ha.	National
	Monument Wood	N47	Recent records of red squirrel in other high quality woodland habitat within 200m, it is also a potential commuting corridor.	Regional
Water vole	Bogenjoss Burn	N37, N38, N40-N42, N45	Poor bankside vegetation and banks unsuitable for water vole burrows. Mink are likely present.	No Value
Amphibians	Gravel Pit Pond II	N49	Palmate newt toad and frog were recorded in this Section. Of the four Gravel Pit Ponds in this Section Gravel Pit Pond II had high value amphibian habitat.	Local
Reptiles	Bogenjoss Burn and surrounding agricultural areas	RPH6, 8, 9 & 13 N33 & N37-N41	No reptiles were recorded, but there is Low, Moderate and High value habitat. The habitat was well-connected particularly along Bogenjoss Burn and adjacent riparian habitats.	Local
Brown Hare	Agricultural land surrounding Howemoss	N33	Hare sightings at N33 and N34. There are arable fields and species-rich hay meadows of High value in addition to 11 other areas assessed as being of local importance to hare.	County
Terrestrial Invertebrates	Monument Wood and surrounding area	N41-N42 and N47	Unimproved acid grassland and rocky outcrops to the N of Monument Wood. Medium value habitat with the potential to support three locally important species (two are UK BAP species).	County
Water shrew	Bogenjoss Burn	N37, N38, N40-N42, N45	Good habitat for water shrew and good invertebrate presence (Freshwater report Appendix 10.16).	Less than Local
Fish	Bogenjoss Burn	N37, N38, N40-N42, N45	The least modified burn in the study area, but still obviously modified. Brown trout, and eels are the most likely fish species to utilise the habitats present. HABSCORE results indicate that the survey areas of Bogenjoss Burn provide suitable habitat for juvenile trout.	County
Freshwater	Bogenjoss Burn	N37, N38, N40-N42, N45	Good ecological value on basis of macroinvertebrate communities present. Upstream section comprising an obviously modified channel with straightening and bank reinforcement. Downstream complex riparian zone and predominantly unmodified habitat. High value ecological habitat.	Regional

Ecological Receptor	Area	Habitat Areas	Features of Interest to Receptor	Evaluation
Section NL4				
Terrestrial Habitats	Banks of the River Don (DWS)	N52	River Don (DWS), supporting species-rich riparian grasslands on each side of the bank and a number of NES LBAP Habitats.	Regional
	Goval Wood	N56	Mosaic of semi-natural habitats, dominated by birch woodland with areas of priority LBAP habitats including wet woodland, un-improved acid grassland, and wet heath habitats.	County
	Goval Belt	N58	Relatively wide shelterbelt of broad-leaved woodland, dominated by mature birch and rowan with records of wych elm (NES LBAP species). This Habitat Area forms an important ecological link between Goval Burn and Goval Wood.	County
	Goval Burn and the Mill Lade	N61	River and reservoir with marginal habitats and wayside trees, and diverse mosaic of habitats, tall herb, grassland, scrub, woodland and semi-improved pasture.	County
	Formartine and Buchan Way (DWS)	N62	Supports species-rich grassland along its embankments and cuttings with scattered areas of scrub and occasional mature trees.	County
	Park Hill Estate	N63	Semi-natural broad-leaved woodland and mature beech plantation of long-established plantation origin, includes the NES LBAP priority habitat, parkland and wood pasture, with records of wych elm.	County
	Skate Wood (Important Local Wildlife Site under the Scottish Wildlife Action Project)	N65	Mature birch and rowan woodland with semi-natural characteristics such as natural regeneration and woodland ground flora.	County
Badgers	River Don, Goval Burn and the Mill Lade	N49, N54, N60, N62 and N67	Four main setts (groups NH, NI, NJ and NK) one subsidiary sett (NJ) alternative setting habitat available around Goval. High quality foraging and commuting habitat. Isolated from southern movements by River Don.	County
Bats	Agricultural land surrounding railway and Dyce Road	N49-N50	Agricultural land, scattered trees and scrub, a linear commuting corridor	County
	Banks of the River Don	N52	This area offers foraging, commuting and roosting opportunities and supports pipistrelles and Daubenton's bats and supporting maternity roosts for Daubenton's bats.	National
	Goval Burn and the Mill Lade	N61	One roost at the Parkhill pumping station with good riparian habitat for foraging and commuting.	Regional
	Woodland around Goval House	N53	Mature broad-leaved woodland of long-established plantation origin offering foraging and roosting opportunities.	County
	Agricultural fields surrounding the banks of the River Don	N54	Farmland offering foraging and commuting opportunities.	County
	Goval Wood	N56	Mosaic of semi-natural habitats including semi-natural broad-leaved woodland that offers foraging and roosting potential.	County
	Goval Belt	N58	Broad-leaved woodland shelter belt dominated by birch with occasional rowan offers foraging and roosting opportunities.	County
	Agricultural fields south of Goval Belt between A947 and Formartine & Buchan Way	N60	In conjunction with N61 the riparian vegetation and burn habitats support foraging and commuting bats	County
	Formartine and Buchan Way (DWS)	N62	Linear, species-rich grassland along embankments and cuttings providing foraging and commuting habitat.	County

Ecological Receptor	Area	Habitat Areas	Features of Interest to Receptor	Evaluation
Bats [cont'd]	Parkhill Estate	N63	Semi-natural broad-leaved woodland and mature beech plantation of long-established plantation origin providing roosting opportunity and foraging.	County
	Skate Wood	N65	Mature broad-leaved woodland appreciably enriches the county habitat resource by providing excellent foraging and roosting habitat and strategically placed connecting habitat between areas used by bats.	County
	Agricultural fields to the north of Meadow Head	N69	Field boundaries and farms support foraging community of bats.	County
Breeding Birds	River Don (DWS)	N52	Includes Goval Burn and Corsehill Burn and their associated riparian habitats and the species rich grasslands along the Formartine and Buchan Way, which provide good foraging and breeding opportunities. Whooper swan (a WCA (1981) Schedule 1i species) was recorded on the River Don.	County
	Woodland around Goval House	N53	Mature broad-leaved woodland of long-established plantation origin adjacent to the River Don providing scattered/localised foraging and breeding opportunities.	County
	Goval Wood and Goval Plantation	N56 & N57	Two contiguous areas of woodland. The first area comprises a mosaic of semi-natural habitats, dominated by birch woodland with areas of priority NES LBAP habitats including wet woodland, unimproved acid grassland and wet heath habitats offering good foraging and breeding opportunities. The second area comprises semi-mature commercial coniferous plantation offering occasional foraging and breeding opportunities.	County
	Goval Burn and the Mill Lade	N61	Riparian habitats comprising wet woodland and scattered scrub providing good foraging and breeding opportunities.	County
	Parkhill Estate	N63	Semi-natural broad-leaved woodland and mature beech plantation of long-established plantation origin interspersed with cattle-grazed improved grassland providing scattered / localised foraging and breeding opportunities. This area is a small proportion of a much larger area that includes the NES LBAP priority habitat, parkland and wood pasture.	County
Wintering Birds	Area in Nether Kirkton surrounding the River Don (DWS) and River Don DWS	N50, N51 & N52	Species-rich and marshy grassland with scattered scrub and riparian habitats on banks of River Don with additional important in-channel freshwater habitats. Banks support species-rich grassland, scattered scrub and tall herb habitats. Habitats provide shelter and good foraging opportunities. WCA1i species (fieldfare and whooper swan). Birds Directive Annex I species (smew) seen on River Don.	Regional
	Farmland between River Don and B977 and Quarry North of Railway Line	N49 & N54	Farmland, large arable fields and improved grassland pasture with scattered scrub and shelterbelts of mature mixed plantation providing good foraging opportunities.	Regional
	Agricultural fields in Goval area	N55, N60, N64, N59	Farmland of arable and improved fields, borders on the Goval Burn and the Mill Lade providing localised foraging opportunities. WCA1i species (fieldfare and redwing) in N55, N60, N64. WCA1i species (fieldfare) in N59.	County
	Formartine and Buchan Way	N62	Arable fields and species rich grassland with scattered scrub providing shelter and localised foraging opportunities. WCA1i species (fieldfare and redwing).	County
	Goval Belt and Goval Burn and Lade	N58 and N61	Relatively wide shelterbelt of broad-leaved woodland, dominated by mature birch and rowan with records of wych elm. River and reservoir with marginal habitats and wayside trees, and diverse mosaic of habitats: tall herb, grassland, scrub, woodland and semi-improved pasture providing shelter and localised foraging opportunities.	County
	Park Hill Estate	N63	Semi-natural broad-leaved woodland and mature beech plantation of long-established plantation origin, amongst cattle-grazed improved grassland providing shelter and localised foraging opportunities.	County
	Agricultural fields surrounding the Formartine and Buchan Way and Buchan Way	N69 and N73	Extensive area of farmland with arable and improved grassland and well-maintained dry stone walls and areas of marshy grassland and occasional small blocks of conifer and mixed plantation providing shelter and localised foraging opportunities. WCA1i species (fieldfare) in N73.	County
	Den Wood and Roadside Plantations	N67	Commercial conifer plantation with mature and young blocks providing shelter and good foraging opportunities.	Regional

Ecological Receptor	Area	Habitat Areas	Features of Interest to Receptor	Evaluation
Wintering Birds [cont'd]	Agricultural fields surrounding the Formartine and Buchan Way	N68, N69 & N70	Extensive area of farmland comprising arable and improved grassland with well-maintained dry stone walls, occasional trees and scrub and areas of marshy grassland and modified burn channels.	Regional
	Banks of the River Don (DWS) and River Don DWS	N50, N51 & N52	Species-rich and marshy grassland with scattered scrub and riparian habitats on banks of River Don with additional important in-channel freshwater habitats. Banks support species-rich grassland, scattered scrub and tall herb habitats. Habitats provide shelter and good foraging opportunities. WCA1i species (fieldfare and whooper swan). Birds Directive Annex I species (smew) seen on River Don.	Regional
	Farmland between River Don and B977 and Quarry North of Railway Line	N49 & N54	Farmland, large arable fields and improved grassland pasture with scattered scrub and shelterbelts of mature mixed plantation providing good foraging opportunities.	Regional
Otters	River Don	N52	Otter present with a holt on the W bank, good foraging due to fish stocks present, commuting and laying up sites riparian habitat vital to maintaining populations.	National
	Goval Burn	N54, N55, N59-N61	Otter present five holts and three couches, good foraging due to fish stocks present, commuting and laying up sites riparian habitat vital to maintaining populations.	National
	Mill Lade	N55	Otter present good foraging due to fish stocks present, commuting and laying up sites supporting surrounding populations.	Regional
	Parkhill Loch	N63	Otter present good foraging due to fish stocks supporting surrounding populations.	Regional
	Corsehill Burn and Ponds	N64, N66 & N68	Good foraging due to fish and amphibians (Corsehill Pond), the Burn also provided commuting habitat.	County
Red Squirrels	Goval Wood and Goval Belt	N56-N58	Red squirrel present including recent sighting, suitable breeding and foraging habitat part of contiguous woodland >500m	Regional
Water vole	River Don	N52	Good bankside vegetation and banks suitable for water vole burrows. Mink are present.	Local
	Goval Burn	N54, N55, N59-N61	Moderate bankside vegetation and banks suitable for water vole burrows. Mink are present.	Local
Amphibians	Goval Reservoir and Corsehill Pond	N61 and N68	A small number of eggs and tadpoles were recorded, but the habitat is sub-optimal with little suitable vegetation.	Less than Local
Reptiles	Areas surrounding Goval and the Formartine and Buchan Way	RPH 16,17,18 and 19, N54-N55, N60-N61 and N64	No reptiles were recorded, but the habitats were of Moderate and High value. They are well-connected particularly along Goval Burn, the River Don and adjacent riparian habitats.	Local
Brown Hare	Fields surrounding the River Don, Goval and the Formartine and Buchan Way	HAs N49-N51, N54-N55. N59-N60, N64 N68-N73	Arable fields and improved and marshy grassland, shelter provided by broad-leaved semi-natural woodland and scattered scrub.	Local
Terrestrial Invertebrates	Area surrounding Goval	N56-N60	It has the potential to support five locally important species (four are UK BAP species) Goval Wood and its surrounding habitats presents a mosaic of woodland and riparian habitats of Medium value to terrestrial invertebrates.	County
Water shrew	River Don	N52	Moderate habitat for water shrew and good invertebrate presence (Freshwater report Appendix 10.16), good value habitat.	Less than Local
	Goval Burn	N54, N55, N59-N61	Good habitat for water shrew and good invertebrate presence (Freshwater report Appendix 10.16), good value habitat.	Less than Local

Ecological Receptor	Area	Habitat Areas	Features of Interest to Receptor	Evaluation
Fish	River Don	N52	Good ecological health (SEPA Classification B) but significantly modified. However, assessed as of national ecological value due to importance as a salmonid fishery. Salmonids, lamprey, eel, 3-spined stickleback, perch, pike and minnow are the most likely fish species to utilise the habitats present. HABSCORE results indicate that the survey area of the River Don provides suitable habitat for juvenile salmon and trout.	National
	Goval Burn	N54, N55, N59-N61	A large/heavily modified tributary. Brown trout, sea trout, brook lamprey and eels are the most likely fish species to utilise the habitats present. HABSCORE results indicate that the survey areas of the River Don provides suitable habitat for juvenile salmon and trout	Regional
	Mill Lade	N55	Canalised, slow flowing, deep, concrete walled channel with silt substrate and extensive macrophyte growth. Brown trout, brook lamprey, eel, 3-spined stickleback, and minnow are the most likely fish species to utilise the habitats present. This watercourse offers no spawning habitat for salmonids but small brown trout may be present if they are able to access the mill lade at the upstream end. The results of the HABSCORE assessment indicate that the survey area of the Goval Mill Lade Aqueduct provides suitable habitat for juvenile trout .	Less than Local
	Corsehill Burn	N64, N66,	Steep gradient, moderate-low flow, and the substrate matrix comprises large boulders, cobbles, gravel/coarse sand and fine sand/silt. Salmonids, lamprey and eel are the most likely fish species to utilise the habitats present. HABSCORE results indicate that the survey areas of the Corsehill Burn provide suitable habitat for juvenile salmon and trout.	Local
	Corsehill Burn South	N68	Steep gradient, moderate-low flow, and the substrate matrix comprises large boulders, cobbles, gravel/coarse sand and fine sand/silt. Salmonids, lamprey and eel are the most likely fish species to utilise the habitats present. HABSCORE results indicate that the survey areas of the Corsehill Burn provide suitable habitat for juvenile salmon and trout.	Local
Freshwater	River Don	N52	Good ecological health, on the basis of macroinvertebrate communities present and water quality data. Identified as being significantly modified due to the bank re-profiling and reinforcement. However, supports salmonids and is a High value ecological habitat.	National
	Goval Burn	N54, N55, N59-N61	Good ecological health based on macroinvertebrate communities present, higher than the SEPA water quality data of Fair. Although was severely modified, reinforced and had re-profiled banks into the Mill Lade Aqueduct it is High value ecological habitat.	County
	the Mill Lade	N55	Good ecological health, based on macroinvertebrate communities present. However, it is an entirely artificial watercourse with little in-stream and bankside habitat and a regulated flow regime.	Local
	Corsehill Burn	N64, N66,	Good ecological health, based on macroinvertebrate communities present, but it is a severely modified channel, an entirely straightened embanked field drain. Low value ecological habitat.	Local
	Corsehill Burn South	N68	Good ecological health, on the basis of macroinvertebrate communities present, but it is a severely modified channel, an entirely straightened embanked field drain. Low value ecological habitat.	Local
Section NL5				
Terrestrial Habitats	Corby and Lily Lochs SSSI, DWS, SINS, complex with Bishop's Loch	N85	A range of habitats that include open water, swamp, basin mire (poor fen vegetation), wet heath, wet woodland, scrub and drainage channels UK BAP and NES LBAP Priority Habitats present.	National
	Red Moss Raised bog at Red Moss, N of B977	N75	Lowland raised bog habitats comprised of wet modified bog with a central dome supporting drier peat bog vegetation, UK BAP Priority Habitats.	Regional
	Newton of Shielhill (DWS)	N88	Small Habitat Area comprising a waterbody supporting swamp and marginal vegetation, with localised gorse scrub. A recent broad-leaved woodland plantation is located along the roadside at Newtonhill.	County

Ecological Receptor	Area	Habitat Areas	Features of Interest to Receptor	Evaluation
Terrestrial Habitats [cont'd]	Woodland at Red Moss, N of B977	N74	Mature semi-natural broad-leaved woodland dominated by birch and rowan with localised areas of wet woodland, wet heath and acid grassland. Connected to Littlejohn's Wood and Red Moss.	County
	Corsehill Wood	N71	Plantation and semi-natural broad-leaved woodland connected to woodland habitats at Den Wood to the S and Littlejohn's Wood to the NE.	County
	Littlejohn's Wood	N72	Conifer plantation with naturally regenerated birch woodland in the NW and boundary features of mature beech trees. Connected to Red Moss and Corsehill Wood.	County
Badgers	Littlejohn's Wood and Harehill	N67, N85, N91 and N93-N94	Two main setts (NL and NN) and territory for groups NK, NL, NM and NN around Den Wood, Littlejohn's Wood and Harehill. Supports alternative foraging and commuting habitat. Limited alternative setting habitats.	County
Bats	Cranfiled treelines and treelines surrounding Harehill	N90-N91	Roost at Harehill (N90-N91) maintains populations of soprano and pipistrelles and supports foraging between Red Moss and Harehill.	County
	Agricultural fields between Harehill Farm and Blackdog Burn	N93	The site once supported a roost and has potential to do so in the future.	Regional
	Corsehill Wood	N71	Plantation and semi-natural broad-leaved woodland offering foraging and commuting habitat of increased value since felling in Littlejohn's Wood, and provides part of a green corridor which includes the Parkhill Estate (N63), Skate Wood (N65), Littlejohn's Wood (N72) and Red Moss (N74-N83).	County
	Littlejohn's Wood	N72	Coniferous woodland with birch regeneration linked to Corsehill and Red Moss Woodlands, providing foraging and roosting resources and connecting corridors between these woods and Den Wood.	County
	Woodland at Red Moss	N74 and N83	Semi-natural broad-leaved woodland supporting pipistrelle and brown long-eared bats by offering foraging and roosting potential.	County
	Moss Belt Plantation	N79	Mature mixed plantation shelter belt offering foraging and roosting potential.	County
	Newton of Shielhill (DWS)	N88	A small pond with swamp, marginal vegetation and a broad-leaved woodland offers excellent foraging habitat for bats including *Myotis* sp. (probably Daubenton's bats)	County
	Adjacent to Moss Belt	N78	Mosaic of habitats including mature boundary trees, wet heath, grassland and scrub, offers a commuting corridor between foraging habitats for bats including pipistrelles.	County
	Loch Hills Quarry	N80	Agricultural land with a pond and dry stone walls offers commuting and foraging habitat	County
	Red Moss	N82	Wet modified bog with scrub and scattered birch around the edge and buildings offers excellent foraging.	County
	Woodland between Red Moss and Lochgreens Farm	N83	Woodland connecting areas of habitat and provides suitable roosting and foraging opportunities along green corridor which includes the Parkhill Estate (N63), Skate Wood (N65), Corsehil Wood (N71), Littlejohn's Wood and the rest of the Red Moss area (N74-N83).	County
	Agricultural fields surrounding Red Moss and Loch Greens Farm	N84-N87	Farmland with beech copse and localised semi-natural habitats that offer foraging and roosting opportunities.	County
	Corby and Lily Lochs	N85	Wetland habitat that offers excellent foraging habitat.	County
Breeding Birds	Littlejohn's Wood	N72	Woodland comprising predominantly conifer plantation with naturally regenerated birch woodland in addition to boundaries of mature beech trees providing localised / scattered foraging and breeding opportunities and important ecological links to Red Moss and Corsehill Wood.	County
	Corby and Lily Lochs (SSSI, DWS and SINS)	N85	Corby and Lily Loch offering good breeding and foraging wetland habitat including wet woodland and scrub. Red-throated diver and scaup (WCA (1981) Schedule 1i species) were recorded on Corby Loch.	Regional

Ecological Receptor	Area	Habitat Areas	Features of Interest to Receptor	Evaluation
Breeding Birds [cont'd]	Agricultural fields South of Lochgreens Farm and between Lochgreens Road / Gravel Pit	N84 & N87	Farmland of large arable, improved and marshy grassland fields, including a small copse of mature beech around a walled area of acid grassland (N84) offering localised / scattered breeding and foraging and large fields of species-poor hay meadows and grazing pasture offering limited breeding and foraging (N87).	County
	Newton of Shielhill (DWS)	N88	A small Habitat Area comprising a small waterbody supporting swamp and marginal vegetation, with localised areas of gorse scrub providing scattered / localised foraging and breeding opportunities. A recent broad-leaved woodland plantation is located along the roadside at Newtonhill.	County
	Backhill of Cranbog	N89	Arable farmland with areas of young coniferous plantation woodland and a series of small ponds and marshy grassland providing localised / scattered foraging and breeding opportunities. Two WCA (1981) Schedule 1i species (barn owl and red-backed shrike) were recorded in this area.	County
	Blackdog	N93	Arable farmland with scattered gorse scrub and bracken and young coniferous plantation woodland providing localised / scattered foraging and breeding opportunities.	County
Wintering Birds	Woodland at Red Moss, North of B977	N74	Mature semi-natural broad-leaved woodland dominated by birch and rowan with localised areas of wet woodland, wet heath and acid grassland providing shelter and good foraging opportunities.	Regional
	Corby and Lily Lochs	N85	Corby and Lily Loch (part of the SSSI, SINS loch complex) comprising wetland habitat providing shelter and good foraging opportunities. Birds Directive Annex I species (smew, pink-footed goose and greylag goose).	National
Breeding birds	Areas around Lochgreens Farm	N80, N81, N83, N84, N86 & N87	Two small ponds, gravel and sand quarry, with areas of bare ground and sparse vegetation, arable fields, species-poor semi-improved grassland, species-poor hay meadows, grazing pasture and improved grassland, with localised semi-natural habitats and scattered scrub and areas of semi-natural broad-leaved woodland, bog habitats, semi-natural ground flora providing shelter and good foraging opportunities. WCA (1981) Schedule 1i species (fieldfare and redwing) in N87.	Regional
	Backhill of Cranbog	N86, N87, N88, N89 & N90	Farmland, unmanaged grassland, scattered gorse scrub and bracken and young coniferous plantation woodland with a localised small waterbody supporting swamp and marginal vegetation and localised areas of gorse scrub providing shelter and localised foraging opportunities. WCA (1981) Schedule 1i species (fieldfare and redwing) in N87 and N90 and Birds Directive Annex I species (pink-footed goose) in N90.	County
	Fifehill	N94, N93, N96 & N97	Farmland comprising arable and improved grassland fields with localised areas of dense gorse scrub, semi-improved grassland and young broad-leaved and mixed woodland plantation providing shelter and localised foraging opportunities. WCA (1981) Schedule 1i species (merlin) in N94, N96 and N97.	Regional
Otters	Corby and Lily Lochs	N84-N87	Otter present, maintain populations due to their high fish and eel numbers and lying up sites and potential breeding sites. The other waterbodies support these.	National
	Blackdog Burn	N91, N93, N94 and N95	Maintains the population due to the presence of a holt and good potential for foraging and commuting.	Regional
	Blackdog Ditch	N94	Low value otter habitat and no otter signs recorded. Otters are only likely to use ditch occasionally and the ditch is not important to the maintenance of the species.	County
	Red Moss Burn	N82-N87	Otter present, high value otter habitat, with foraging and lying up sites.	County
	Loch Hills Pond, Loch Green Pond and Gourdieburn Pond	N80 & N95	No otter signs, but foraging in the form of amphibians and lying up sites available.	County
	Sand Pit Pond	N88	Otter present with good foraging and lying up potential.	County
	Harehill Burn and Middlefield Burn	N92 and N97	No signs of otter at these burns, but offer foraging and lying up sites and commuting for Middlefield Burn.	County
Red Squirrels	Littlejohn's and Corsehill Woods	N71-N72	Red squirrels present, suitable breeding and foraging habitat that forms part of a contiguous woodland > 500m.	Regional

Ecological Receptor	Area	Habitat Areas	Features of Interest to Receptor	Evaluation
Amphibians	Loch Greens Pond	N80	High value pond at Loch Hills Farm where palmate newt, frogs and toads were recorded. Six other ponds present in this Section of Low to Moderate value.	Local
Reptiles	Agricultural land surrounding Loch Greens and Red Moss	RPH21-24, N80, N83-N84 and N87	No reptiles were recorded, the habitats is this area were of Low, Moderate and High value and well-connected particularly along Red Moss field drains and adjacent riparian habitats.	Local
Brown Hare	Agricultural land surrounding Red Moss, Loch Green, Harehill	N76, N80, N84, N86-N87, N89-N93	Hare sighting at Lochgreens (N84), improved grassland with plantation woodland, scattered trees and scrub.	Local
Terrestrial Invertebrates	Corby Loch	N84-N85	Potential to support five locally important species (four are of UK BAP species). Marshy grassland and open water at Corby Loch present a mosaic of High value habitats.	Regional
	Red Moss	N82-N83	Potential to support six locally important species (three of which are UK BAP species), heathland species such as the large heath butterfly are present.	County
Water shrew	Red Moss Burn	N82-N87	Moderate habitat for water shrew and good invertebrate presence (Freshwater report Appendix A10.16), good value habitat.	Less than Local
	Black Dog Burn	N91 and N93-N95	Good habitat for water shrew and good invertebrate presence (Freshwater report), good value habitat.	
Fish	Red Moss Burn	N82-N87	Small, heavily peat-stained water that runs into Corby Loch. The site gradient is moderate, the flow is low, substrate comprises sparse areas of gravel/coarse sand dominated by areas of habitats present. HABSCORE results indicate that the survey area of the Red Moss Burn provides fine sand/silt. Brown trout, brook lamprey, eel, 3-spined stickleback and eel are the most likely fish species to utilise the suitable habitat for juvenile trout.	Local
	Black Dog Burn	N91 and N93-N95	Small, steep gradient, low flow, and substrate comprises large boulders, cobbles, gravel/coarse sand and fine sand/silt. It also has areas of submerged vegetation, CWD, undercut banks, overhanging vegetation, and areas of deep water. The concrete apron at the A90 crossing may represent a barrier to migration. Brown trout, brook lamprey and eel are the most likely fish species to utilise the habitats present. HABSCORE results indicate that the survey areas of the Blackdog Burn provide suitable habitat for juvenile trout..	
Freshwater	Red Moss Burn	N82-N87	Fair ecological health, based on macroinvertebrate communities present and is a small, straightened field drain. However, it does drain into Corby Loch.	County
	Black Dog Burn	N91 and N93-N95	Good ecological health based on the macroinvertebrate communities present. It is significantly modified with extensive re-profiling and straightening, but is large and comprises habitats of High ecological value.	

10.4 Potential Impacts

Introduction

10.4.1 This section identifies the potential risks and predicts the associated impacts upon ecological receptors without mitigation.

10.4.2 Generic impacts associated with road developments identified in DMRB include:

- direct mortality of animals on roads during construction and operation;
- behavioural changes of animals during operation
- habitat loss through land-take;
- severance or fragmentation of existing Habitat Areas;
- physical obstructions caused by road constructions and bridges;
- disturbance during construction;
- pollution via road drainage, runoff and spray from road traffic;
- air pollution; and
- visual and light pollution caused by road lighting.

10.4.3 Additionally, for species relying on aquatic resources potentially affected by watercourse crossings, the following general impacts have been considered:

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

10.4.4 These impacts are discussed in general terms, followed by consideration of particular aspects relevant to each habitat and species.

Direct Mortality

10.4.5 Work during the construction phase involving vegetation clearance, earthworks and heavy machinery could result in direct mortality of a number of species. Breeding and resting places for particular species such as nests (birds), dreys (red squirrel), setts (badgers), holts (otters), roosts (bats) and redds (salmon) could be occupied during preconstruction clearance. For all protected species and breeding birds, (i.e. those animals for which legal status prohibits disturbance or injury, even while the integrity of the population may not be compromised), direct mortality caused by the construction of the road would constitute a significant impact.

10.4.6 Direct mortality resulting from road traffic accidents (RTAs) during operation could also constitute a significant impact for protected species and breeding birds. Otters, badgers and red squirrel are at particular risk where the road severs their territories or crosses a watercourse.

Habitat Loss

10.4.7 The proposed scheme is predicted to result in direct loss of habitat. This could result in significant adverse impacts both in terms of the actual habitat loss – if the habitat is particularly diverse, rare and/or difficult to replace – and in terms of the species that it supports, for example foraging areas, resting/breeding sites or commuting corridors.

Habitat Fragmentation and Isolation

10.4.8 Without the inclusion of mitigation, the proposed scheme would result in considerable habitat fragmentation both at a local and regional scale. Loss of connectivity between habitats can severely impair the viability of some species' populations. Those species particularly vulnerable in the vicinity of the proposed scheme are red squirrel, where future survival of local populations could be at stake, and bats, where commuting routes can be disrupted, preventing foraging (see below).

Disturbance

10.4.9 Disturbance impacts can range from very serious to negligible, depending on the sensitivity of the ecological receptor, the ability of the receptor to move away from the source of disturbance and the magnitude and duration of the source of disturbance. Continuous disturbance of breeding, resting sites or foraging sites of sensitive animals may result in an adverse impact on the overall viability of the population. Intermittent disturbance of foraging or breeding sites on mobile species where alternative habitat is available would have little or no impact on the local population.

Pollution and Other Indirect Impacts

10.4.10 Accidental spills of chemicals and other potentially toxic substances during construction of the proposed scheme may occur from machinery. Vegetation removal and earthmoving activities may lead to sediment laden runoff reaching watercourses. During operation, there is risk of pollution from surface water runoff contaminated by vehicles or by de-icing salts (which may contribute to saline pollution). The introduction of a new road can change soil density, temperature, soil water content, light levels, dust, surface waters, patterns of runoff, and sedimentation, as well as adding heavy metals (especially lead), salts, organic molecules, ozone and nutrients to roadside environments. Road construction and operation can also result in the physical modification of watercourses through changes to sediment and discharge regimes.

10.4.11 Roads can promote the dispersal of exotic species by altering habitats, stressing native species and providing movement corridors. Native species may also change their home range during operation, resulting in displacement and stress affecting reproductive success. Roads can also promote increased disturbance of animals by humans, causing changes in home ranges, movement, reproductive success, escape response, and physiological state. During construction and operation, light pollution may affect the behaviour of nocturnal animals such as bats or alter the behaviour of fish.

10.4.12 Full details of these impacts in relation to habitats and individual species are provided in Appendices A10.1 – A10.16.

10.4.13 In this chapter, the specific impacts on each species are assessed and summarised for Sections NL1 to NL5. Impacts of Minor or lower significance are not generally discussed, as generic mitigation measures will be sufficient to avoid or reduce these impacts to Negligible significance residual impacts.

Impact Significance

10.4.14 Impacts are described below and listed in Tables 10.11 and 10.12 (Construction and Operation Impacts respectively).

Terrestrial Habitats

10.4.15 The total amount of land-take required in order to construct the Northern Leg of the proposed scheme is estimated at approximately 3.16km^2 / 316ha. Table 10.10 shows the estimated total pre-construction and post-construction areas of Phase 1 Habitats present within the proposed land-take. The post-construction figures take account of both anticipated habitat loss to construction and habitat created or changed as a result of mitigation.

Table 10.10 – Summary of Areas of Land-take by Phase I Habitat Category

Phase 1 Habitat Description	Phase 1 Habitat Categories within proposed scheme land-take	
	Pre-construction (Ha)	Post-construction (Ha)
Woodland mixed plantation	6.57	25.53
Woodland broadleaved plantation (including standard trees)	3.57	4.22
Woodland broadleaved semi-natural	7.06	2.16
Woodland coniferous plantation	19.19	14.28
Scattered scrub	4.30	11.30
Dense continuous scrub	4.94	13.56
Acid grassland semi-improved	2.32	1.86
Acid grassland unimproved	0.47	0.43
Amenity grassland	0.83	0.63
Improved grassland	153.04	112.41
Marshy grassland	1.91	1.44
Neutral grassland semi-improved	0.41	0.36
Neutral grassland unimproved	0.16	0.16
Poor Semi-improved grassland	18.06	13.13
Arable	88.42	39.61*
Built up areas (buildings)	1.42	0.72
Herb & Fern bracken continuous	1.71	0.24
Open water	0.29	0.13
Parkland broadleaved	0.59	0.26
Parkland coniferous	0.22	0.07
Heathland wet heath acid	0.15	0
Total	**315.63**	**242.50**

**Figure assumes all potential return to agriculture is achieved*

Section NL1

10.4.16 There are no Moderate or greater significance impacts identified for terrestrial habitats in this section.

Section NL2

Construction

10.4.17 Temporary habitat loss, disturbance, fragmentation and potential pollution in and surrounding Craibstone Burn and Campus (HA24-26) and the habitat surrounding Gough Burn is assessed as being of Moderate significance.

Operation

10.4.18 Permanent habitat loss in and surrounding Craibstone Burn involves high value pond and stream habitats. This, together with further operational impacts caused by disturbance, fragmentation and pollution due to particulate or chemical runoff is assessed as being of Moderate significance.

Section NL3

Construction

10.4.19 Temporary habitat loss, disturbance, fragmentation of Kirkhill Forest, Standingstones Wood, and agricultural land around Howemoss including potential pollution of the valuable riparian habitat surrounding Bogenjoss Burn would be of Moderate significance.

Operation

10.4.20 Habitat loss of farmland between Newton and Upper Corsehill including the loss of dry stone walls results in impacts of Moderate significance. Habitat loss would also constitute a Moderate significant impact in the area surrounding Bogenjoss Burn (including Kirkhill Forest and Standingstones Wood). Although occurring during the construction phase, this habitat loss would be permanent and is thus considered an operational impact. Further potential impacts caused by disturbance, fragmentation and pollution due to particulate or chemical runoff are assessed as being of Moderate significance.

Section NL4

Construction

10.4.21 Disturbance, fragmentation and potential pollution of the valuable riparian habitat surrounding River Don, Goval Burn and the Mill Lade. The loss of species-rich grassland habitats bordering the Formartine and Buchan Way during construction of the proposed scheme would be of Moderate significance.

Operation

10.4.22 Permanent loss of high value riparian habitat would occur along the River Don, Goval Burn and the Mill Lade. The species rich grasslands bordering the Formartine and Buchan Way are also subject to habitat loss, which is predicted to constitute an impact of Moderate significance. Additional operational impacts caused by disturbance, fragmentation and potential pollution due to particulate or chemical runoff are assessed as being of Moderate significance.

Section NL5

Construction

10.4.23 There would be no direct impacts on Corby and Lily Lochs. However, the indirect impacts of fragmentation and disturbance of connecting habitats in the area may adversely affect the wetland habitat and cause a risk of pollution, which would be of potential Major significance on this SSSI. There would be potential impacts of Moderate significance due to fragmentation and disturbance of woodland habitats and potential pollution of aquifers at Littlejohns Wood during construction.

Operation

10.4.24 Potential operational impacts upon Corby and Lily Lochs caused by disturbance and fragmentation of nearby and connecting habitat, and potential pollution due to particulate or chemical runoff are assessed as being of Major significance. Habitat loss and fragmentation of woodland habitats and potential pollution of aquifers at Littlejohns Wood are potential impacts of Moderate significance.

Badger

Section NL1

Construction

10.4.25 There is an outlier badger sett (social group NB) in the area south of Brimmond Hill, therefore potential impacts of direct mortality and/or disturbance of badgers due to clearance are of Moderate significance.

Operation

10.4.26 The risk of direct mortality due to badger RTAs in the Cloghill and Brimmond Hill areas is assessed as being of Moderate significance. Habitat loss and fragmentation of setting and foraging habitat for social groups NA and NB constitutes a Moderate significance impact.

Section NL2

Construction

10.4.27 The risk of direct mortality due to the damage/destruction of an outlier sett of social group NC in Craibstone during construction of the proposed scheme represents a potential impact of Moderate significance.

Operation

10.4.28 The risk of direct mortality due to RTAs and disturbance in this area would be of Moderate significance during operation. Potential impacts of Moderate significance impacts are also predicted due to the severance of social group NC's territory and loss of foraging habitat.

Section NL3

Construction

10.4.29 The risk of direct mortality during clearance for construction of seven setts for social groups NE, NF and NG would be of Major significance to the Kirkhill Forest and Bogenjoss Burn area.

Operation

10.4.30 The risk of direct mortality due to RTAs and disturbance in this area would be potential impacts of Major significance. Habitat loss of setting and foraging habitat, disturbance and severe fragmentation of territory groups ND, NE, NF and NG and of Bogenjoss Burn as a wildlife corridor are potential impacts of Major significance.

Section NL4: ch322600 – 325370 (Nether Kirkton - Corsehill)

Construction

10.4.31 The risk of direct mortality during clearance of two setts for social group NJ in River Don and Goval Burn represents a potential impact of Moderate significance.

Operation

10.4.32 The risk of direct mortality due to RTAs, loss of setting and foraging habitat, disturbance and severe fragmentation of territory for groups NH, NI, NJ and NK and riparian commuting habitat along Goval Burn and Bogenjoss Burn would be of Moderate significance.

Section NL5

Construction

10.4.33 The risk of direct mortality during clearance of setts (one outlier sett NN) during construction in the Harehill area is of Moderate significance.

Operation

10.4.34 The risk of direct mortality due to RTAs, habitat loss, disturbance and fragmentation of setting and foraging habitat of groups NK, NL, NM and NN represent potential impacts of Moderate significance in the Harehill area.

Bats

Section NL1

Construction

10.4.35 There is no potential direct mortality predicted in this section as no roosts are to be demolished or felled during construction. There would be likely to be disturbance during construction in the Newton Farm area (ch31350 – 315600) where a historical roost was recorded, especially due to the construction of North Kingswells Junction; and flight line disruption at Ashtown Road would be of Moderate signficance to commuting bats. There is also a risk of deterioration of water quality at Kepplehill Burn during construction resulting in impacts of Moderate significance. Construction of the proposed scheme would cause minimal loss of scrub and foraging habitat in this section near Kepplestone Farm.

Operation

10.4.36 The risk of direct mortality due to RTAs between the roost at Newton Farm and foraging sites would be an impact of Moderate-Major significance due to the severance of flight routes including Ashton Road. Potential lighting disturbance to populations at this roost would of Moderate significance. Disturbance, severance and fragmentation at Kepplehill Burn, and in the Newhills Woods area (in particular where the proposed scheme crosses Ashton Road and Gough Burn causing disruption of flight lines and severance between foraging areas at Kepplestone Wood/Newhills Wood and roosting areas at Newton Farm and Kepplestone House) would be of Moderate significance.

Section NL2

Construction

10.4.37 No known roosts would be impacted, however there is potential for Moderate significance impacts due to direct mortality in unidentified roosts due to demolition at Sunnybank cottages and felling on the SAC Craibstone campus. The risk of direct mortality also poses an impact of Moderate significance during felling of mature trees adjacent to Craibstone Burn and Green Burn. The associated potential disturbance and disruption of flight lines during construction in these aeas is considered to be of Moderate significance. Potential pollution of Craibstone, Gough and Green Burns is also of Moderate significance.

Operation

10.4.38 Risk of direct mortality due to RTAs in the Gough Burn, Craibstone and Green Burn areas would be an impact of Moderate significance. Potential Moderate significance impacts are also predicted in the area due to permanent habitat loss, disturbance from junction lighting, and the fragmentation of valuable riparian roosting, foraging and commuting habitat along Gough Burn, Craibstone Burn and

Green Burn. These watercourses are also potentially subject to pollution during the operational phase of the proposed scheme, which would also be of Moderate significance.

Section NL3

Construction

10.4.39 No known roosts are to be destroyed, but potential direct mortality due to clearance of trees for construction in Chapelbrae Wood, Monument Wood, Standingstones Wood, East Woodlands, Kirkhill Forest North and along Bogenjoss Burn is an impact of Moderate significance. Disturbance and fragmentation of these areas including disturbance to roosting, foraging or commuting bats is assessed as being of Moderate significance. Potential pollution of Bogenjoss Burn and disruption to foraging areas during realignment of the burn is also of Moderate significance.

Operation

10.4.40 Potential for direct mortality due to RTAs caused by severance of flight lines in the area of Standingstones Wood/Kirkhill Forest North and Farburn Wood (DWS), along Bogenjoss Burn, and between East Woodlands and Monument Wood is of Moderate significance. Potential permanent habitat loss is also assessed as being of Moderate significance and includes walls and species-rich verges near Standingstones Wood, woodland at Standingstones Wood and East Woodland, conifer plantation at Kirkhill Forest and riparian and freshwater habitat along Bogenjoss Burn. The proposed scheme would also result in the fragmentation and severance of foraging habitat and commuting routes in the areas of Monument Wood, Farburn Wood, Kirkhill Forest and Bogenjoss Burn, which is also likely to be subject to potential pollution due to runoff from the road, which is assessed as being of Moderate significance.

Section NL4

Construction

10.4.41 Potential direct mortality during the felling of mature trees alongside the River Don, Goval Burn and Goval Mill Lade would be of Major significance. Disturbance due to construction of the road is possible if bats are roosting in buildings at Nether Kirkton, Parkhill Pumping Station, or Meadow Head Farm and this would constitute an impact of Moderate significance. Moderate significance impacts are also predicted through disruption of flight lines and commuting routes along and around Goval Burn and the Goval Belt and along a green corridor at Skate Wood. Pollution and severance of commuting routes at the nationally important River Don, during the construction of the river crossing is a Major significance potential impact.

Operation

10.4.42 Potential direct mortality due to RTAs at Nether Kirkton, along Goval Belt and the Formartine and Buchan Way is considered to be of Moderate significance whereas the risk to roosting bats at Parkhill Pumping Station would be of Major significance. Habitat loss, fragmentation and disturbance to the River Don would have Major significance to bat foraging and commuting behaviour along the river.

10.4.43 The proposed scheme would sever flight lines between Nether and Upper Kirkton, the Don and floodplain, between Goval Wood, Goval Belt and Goval Reservoir along Goval Burn and Mill Lade, between Parkhill Estate and Goval and between Skate Wood and Littlejohn's Wood. These would be impacts of Moderate significance. Potential pollution during the operational phase of the road may affect the foraging habitat at the River Don (which would be of Major significance) and along Goval Burn, Goval Mill Lade and Corsehill Burn (which would be of Moderate significance).

Section NL5

Construction

10.4.44 The risk of direct mortality during felling of mature trees along tree lines at Cranfield would be of Moderate significance due the presence of a known roost. Disturbance of any roosting bats in the woodland areas surrounding these areas such as Corsehill Wood, Littlejohn's Wood would constitute an impact of Moderate significance.

10.4.45 Disruption of flight lines and foraging routes during construction is predicted to be a Moderate significance potential impact. The areas affected include Corsehill Wood, Littlejohn's Wood, and the woodland at Red Moss. Further disturbance is predicted during construction of Lochgreens overbridge. Potential pollution to Red Moss Burn, Blackdog Burn and Corby and Lily Lochs during construction works is assessed as being of Moderate significance.

Operation

10.4.46 Direct mortality due to RTAs during operation of the proposed scheme would be likely to result from severance of flight routes alongside Coarsehill Wood, and Littlejohn's Wood, Lochgreens Road, Red Moss Burn, between Newtonhills and Newton of Shielhill, and along the tree lines at Cranfield and is a potential impact of Moderate significance. Permanent habitat loss including woodland at Littlejohn's Wood, Lochgreens Pond, and agricultural fields adjacent to Blackdog Burn would constitute an impact of Moderate significance.

10.4.47 Potential pollution due to runoff from the road would be likely to affect Red Moss Burn (and, indirectly, Corby Loch) and Blackdog Burn with potential adverse impacts on the bats that use these features for foraging and commuting. This would be an impact of Moderate significance.

Breeding Birds

Section NL1

10.4.48 No potential impacts of Moderate or greater significance to breeding birds were identified in this section.

Section NL2

Construction

10.4.49 The area of Craibstone SAC was the most important for breeding birds in this section. Potential impact significance for breeding birds in this area is Moderate due to risk of direct mortality from pre-construction habitat clearance and associated temporary fragmentation (not applicable to Green Burn as most of the Habitat Area would be lost), disturbance, and potential pollution of watercourses (in particular Parkhead Burn, Craibstone Burn / Pond and Green Burn).

Operation

10.4.50 Potential impact significance for breeding birds in Craibstone SAC is Moderate due to the risk of direct mortality from RTAs (particularly at ch316200-317400). These impacts would occur as a result of permanent habitat loss and fragmentation (although these impacts not applicable to Green Burn as most of the Habitat Area would be lost), disturbance and potential pollution of watercourses (as listed above under construction impacts).

Section NL3

Construction

10.4.51 The areas surrounding Howemoss, Kirkhill Forest, Bogenjoss Burn, East Woodlands and Monument Wood are the most important for breeding birds in this section. Potential impact significance for breeding birds in these areas (with the exception of Howemoss) is Moderate due to risk of direct mortality resulting from pre-construction habitat clearance and associated temporary fragmentation, disturbance and potential pollution of Bogenjoss Burn due to accidental spills. A Moderate significance impact for potential pollution impacts to Howemoss Burn is also predicted.

Operation

10.4.52 Potential impact significance for breeding birds in Kirkhill Forest, Bogenjoss Burn, East Woodlands and Monument Wood is assessed as Moderate due to direct mortality from RTAs (particularly ch319700-321600) as a result of permanent habitat loss and fragmentation, disturbance and potential pollution of Bogenjoss Burn due to runoff. A Moderate significance impact for potential pollution impacts to Howemoss burn is also predicted.

Section NL4

Construction

10.4.53 The areas surrounding the River Don and Goval Burn/Mill Lade are the most important for breeding birds in this section. Potential impact significance for breeding birds in the River Don area is Moderate due to risk of direct mortality resulting from pre-construction habitat clearance and associated temporary fragmentation, disturbance and the potential pollution from accidental spills. A Moderate significance impact for potential pollution impacts to Goval Burn/Mill Lade is also predicted.

Operation

10.4.54 Potential impact significance for breeding birds in Goval Burn and Mill Lade is Moderate due to risk of direct mortality from RTAs (particularly ch323000-324800) as a result of permanent habitat loss, disturbance and potential pollution from runoff. A Moderate significance impact for potential pollution impacts to breeding birds in the River Don is also predicted.

Section NL5

Construction

10.4.55 Areas surrounding Lochgreens Farm and Corby/Lily Loch SSSI are the most important for breeding birds in this section. Potential impact significance for breeding birds in agricultural fields south of Lochgreens Farm and between Lochgreens Road and Gravel Pits is Moderate for potential pollution from accidental spills. Potential disturbance and pollution impacts on breeding birds in Corby and Lily Loch SSSI were assessed as of Moderate and Major significance respectively.

Operation

10.4.56 Potential impact significance in this section (agricultural fields south of Lochgreens Farm and between Lochgreens Road and Gravel Pits) is Moderate for risk of direct mortality from RTAs due to permanent habitat loss and fragmentation (particularly ch326800-328100), disturbance, and potential pollution impacts from runoff. Moderate significance impacts for potential pollution impacts to breeding birds at Corby and Lily Loch SSSI and agricultural fields south of Lochgreens Farm respectively are also predicted.

Wintering Birds

Section NL1

Construction

10.4.57 No potential construction impacts of Moderate or greater significance to wintering birds were identified in this section.

Operation

10.4.58 Direct mortality due to RTAs between foraging sites (particularly ch314800-315400), permanent habitat loss and fragmentation, disturbance, and potential pollution would be potential impacts of Moderate significance in Habitat Areas N11-N17. Potential pollution of Kepplestone and Gough Burn would also be impacts of Moderate significance.

Section NL2

Construction

10.4.59 No potential construction impacts of Moderate or greater significance to wintering birds were identified in this section.

Operation

10.4.60 Direct mortality due to RTAs between foraging sites (between ch316300-317400) due to permanent habitat loss and fragmentation, disturbance and pollution to watercourses from runoff would be potential impacts of Moderate significance in Habitat Areas N18-N20, N23-N26 and N28. Potential pollution of Gough Burn, Parkhead Burn, Craibstone Burn and Green Burn would be impacts of Moderate significance.

Section NL3

Construction

10.4.61 No potential construction impacts of Moderate or greater significance to wintering birds were identified in this section.

Operation

10.4.62 Direct Mortality due to RTAs between foraging sites as a result of permanent habitat loss and fragmentation (between ch319100-321700), disturbance and pollution to watercourses from runoff would be potential impacts of Moderate significance in Habitat Areas N30-N35 and N37-N48. Potential pollution of Walton field ditch, Howemoss Burn and Bogenjoss Burn would be impacts of Moderate significance.

Section NL4

Construction

10.4.63 Goval Burn and Mill Lade, and agricultural areas surrounding the River Don (including the River Don DWS) and to the west and east of Goval Burn are the most important for wintering birds in this section. Significance of potential impact in Habitat Areas N50-52 (agricultural areas surrounding and including the River Don) is Moderate for wintering birds resulting from direct mortality due to pre-construction habitat clearance and temporary habitat fragmentation, disturbance and the potential pollution of the River Don from accidental spills.

Operation

10.4.64 Potential impact significance in Habitat Areas N49-52, N54-N55, N58, N60-N64 and N67-N70 is assessed as Moderate for wintering birds resulting from direct mortality due to RTAs between foraging sites as a result of permanent habitat loss and fragmentation (in particular between ch323000-323400 and 324400-324900), disturbance and potential pollution to aquifers from runoff. Pollution of River Don, Goval Burn, Mill Lade and Corsehill Burn are also potential impacts of Moderate significance.

Section NL5

Construction

10.4.65 Woodland surrounding Red Moss, agricultural areas surrounding Lochgreens, Corby and Lily Loch SSSI (N85) and agricultural areas surrounding Backhill of Cranbog and Fifehill are the most important for wintering birds in this section. Temporary fragmentation, disturbance and potential pollution to N85 (Corby and Lily Loch SSSI) from accidental spills are considered to be potential impacts of Moderate significance.

Operation

10.4.66 Potential impact significance in Habitat Areas N74, N80, N81, N83, N86-N90, N93, N94, N96 and N97 was Moderate for wintering birds resulting from risk of direct mortality due to RTAs between foraging sites as a result of permanent habitat loss and fragmentation (in particular between ch325400-326100 and 327400-328300), disturbance and potential pollution to aquifers from runoff. Disturbance in Habitat Area N85 (Corby /and Lily Loch SSSI). Potential pollution of Red Moss Burn, Corby and Lily Loch SSSI, Blackdog and Middlefield Burn would also be impacts of Moderate significance.

Otter

10.4.67 Locations and chainages of culverts/crossings referred to below are listed in Table 10.15, and described further in Chapter 9 (Water Environment).

Section NL1

Construction and Operation

10.4.68 A crossing and depressed invert box culvert is proposed at Kepplehill Burn at ch315200. While construction on the infrequently used Kepplehill Burn is not likely to pose a significant impact for otter, the operational impact is assessed to be of Moderate significance due to the risk of direct mortality due to RTAs and/or drowning in culverts, fragmentation caused by culverting and potential pollution caused by particulate matter or chemical runoff.

Section NL2

Construction

10.4.69 Depressed inverted box culvert crossings are proposed at Gough Burn, Craibstone Burn, and three at Green Burn. Green Burn would also be re-aligned and Craibstone Pond may be indirectly affected by construction activity. Potential impacts of Major significance are predicted during the construction phase of the proposed scheme for Craibstone Burn, Gough Burn and Green Burn due to the risk of direct mortality. Potential pollution of the watercourses due to particulates is also assessed as being of Major significance.

Operation

10.4.70 Permanent habitat loss at Gough Burn, Craibstone Burn, Craibstone Pond, and Green Burn is assessed as being of Moderate significance. Potential disturbance and fragmentation of these burns are assessed as being of Major significance. Risk of direct mortality due to RTAs or drowning in culverts is of Major significance at Gough Burn, Craibstone Burn and Green Burn, and Moderate significance at Craibstone Pond. Potential pollution to the aquifers from runoff during the operational scheme is also of Major significance for all the above waterbodies, except for Craibstone Pond, which is of Moderate significance.

Section NL3

Construction

10.4.71 Potential impacts are identified in this section as a result of six proposed culverts and realignment at Bogenjoss Burn. Potential pollution of the burn, risk of direct mortality, disturbance and habitat fragmentation during these construction activities represent impacts of Major significance.

Operation

10.4.72 Risk of direct mortality due to RTAs (or drowning in culverts at Walton Field Ditch) is assessed as being of Major significance at Bogenjoss Burn and of Moderate significance at Howemoss and Walton Field ditches. At Bogenjoss Burn, permanent habitat loss would constitute an impact of Moderate significance and habitat fragmentation would be of Major significance. Potential pollution of Bogenjoss Burn during the operational scheme due to runoff is also of Major significance.

Section NL4

Construction

10.4.73 This section has the greatest number of Major significance potential impacts, including bridging of the River Don and Goval Burn, realignment and bridging of the B977 and A947, and culverting and realignment of the Mill Lade and of the A947. Corsehill Burn is of lower importance although would be crossed at several points using depressed invert box culverts.

10.4.74 Risk of direct mortality due to clearance of one holt and lying up sites in the Goval Burn area is assessed as being of Major significance, as is disturbance of three holts at Goval and another holt on the banks of the River Don. The River Don and Goval Burn would be bridged, causing a potential impact of Major significance during construction due to disturbance and potential pollution. Disturbance during construction of the crossing and the culverting of the Mill Lade and Corsehill Burn, with potential pollution due to particulates in aquifers is assessed as being of Moderate significance.

Operation

10.4.75 Risk of direct mortality due to RTAs or drowning during the operational scheme is assessed as being of Major significance at the River Don, Goval Burn and the Mill Lade, and Moderate significance at Corsehill Burn. Habitat loss is of Major significance at Goval Burn where lying up sites would be destroyed, and of Moderate significance at Corsehill Burn. Disturbance, fragmentation and potential pollution of the River Don, Goval Burn and the Mill Lade through runoff is also of Major significance and of Moderate significance at Corsehill Burn.

Section NL5

Construction

10.4.76 Two crossings are proposed at Blackdog Burn, one at Red Moss, one at Blackdog Ditch and three at Middlefield Burn. The associated direct mortality, disturbance and fragmentation due to crossing

and culverting of these in high value riparian areas from construction activities is assessed as being of Moderate significance at Red Moss Burn and Blackdog Burn and of Negligible significance at Middlefield Burn and Blackdog Ditch. Potential water pollution is assessed as being of Major significance at Corby and Lily Lochs.

Operation

10.4.77 Risk of direct mortality due to RTAs or drowning in culverts is assessed as being of Major significance at Blackdog Burn and indirectly during commuting to and from Red Moss Burn. There is the potential for direct mortality impacts of Moderate significance at Red Moss Burn, Blackdog Ditch and Middlefield Burn. Fragmentation and potential pollution of Red Moss Burn is of Moderate significance, and these impacts are assessed as being of Major significance at Blackdog Burn. Potential pollution due to runoff is of Major significance at Middlefield Burn and Blackdog Ditch.

Red Squirrel

Section NL1

10.4.78 No suitable habitat was identified for red squirrel in this section and therefore no potential impacts are identified.

Section NL2

Construction

10.4.79 Risk of direct mortality due to clearance for construction represents an impact of Major significance at Craibstone South and Craibstone North. Potential disturbance at these areas is of Moderate significance.

Operation

10.4.80 Risk of direct mortality due to RTAs, and fragmentation of the above areas are all assessed as of Major significance. Potential disturbance and permanent habitat loss are of Moderate significance.

Section NL3

Construction

10.4.81 Risk of direct mortality due to clearance for construction represents an impact of Major significance at Bogenjoss Burn, Kirkhill Forest, Standingstones Woods, East Woodlands and Monument Wood. Disturbance would be of Moderate significance at Monument Wood.

Operation

10.4.82 Risk of direct mortality due to RTAs, along with and fragmentation of the above areas are all assessed as of Major significance. Disturbance and permanent habitat loss are of Moderate significance.

Section NL4

10.4.83 There are no potential impacts of greater than Minor significance predicted to Goval Wood and Goval Belt as there is already an existing road.

Section NL5

Construction

10.4.84 Risk of direct mortality due to clearance for construction at Corsehill Wood and Littlejohn's Wood is assessed as of Major significance, and disturbance in these habitats would be of Moderate significance.

Operation

10.4.85 Direct Mortality due to RTAs, along with habitat loss and fragmentation of the above areas are assessed as of Major significance, and disturbance and habitat loss is of Moderate significance.

Water Vole

10.4.86 No water vole were identified within the study area, although suitable habitat that is of local value would be lost. No significant impacts are predicted.

Hare

10.4.87 Potential impacts of Moderate significance due to disturbance, fragmentation and habitat loss are predicted only in Section NL3 in the area surrounding Howemoss. There were no further impacts of Moderate or greater significance identified for hare in Sections NL1-5.

Water Shrew

10.4.88 No potential impacts of Moderate or greater significance were identified for water shrew in Sections NL1-5.

Reptiles

10.4.89 No potential impacts of Moderate or greater significance were identified for reptiles in Sections NL1-5.

Amphibians

10.4.90 No potential impacts of Moderate or greater significance were identified for amphibians in Sections NL1-5.

Terrestrial Invertebrates

Section NL5

Construction

10.4.91 Potential impacts are of Moderate significance due to potential hydrological impacts upon the wetland habitats surrounding Corby and Lily Lochs.

Fish

10.4.92 Locations and chainages of culverts/crossings referred to below are listed in Table 10.15, and described further in Chapter 9 (Water Environment).

Section NL1

10.4.93 No potential impacts of Moderate or greater significance were identified for fish in this section.

Section NL2

Construction

10.4.94 Culvert crossings of Gough Burn, Craibstone Burn and three of Green Burn are proposed. There would be impacts of Moderate significance to these burns due to risk of direct mortality caused by potential water pollution. Fragmentation and isolation due to stranding during construction are also of Moderate significance. There may also be reduced likelihood of usilising spawning areas upstream at Green Burn due to fragmentation of the habitat.

Operation

10.4.95 Potential pollution due to sediment release and/or polluted material through road runoff is a Moderate significant impact to the above burns.

Section NL3

Construction

10.4.96 Six culverts and realignment at Bogenjoss Burn are proposed. There would be impacts of Moderate significance to Bogenjoss Burn due to potential direct mortality caused by pollution (sediment release). Fragmentation and isolation due to stranding during construction are also of Moderate significance. There may also be loss of spawning areas upstream of the burn due to fragmentation of the habitat, also of Moderate significance.

Operation

10.4.97 Potential pollution due to sediment release and/or polluted material through road runoff and fragmentation due to isolation are assessed as being of Moderate significance to Bogenjoss Burn.

Section NL4

Construction

10.4.98 It is proposed to bridge the River Don and floodplain, and three bridges are proposed to cross Goval Burn. There would be potential impacts of Major significance to the River Don and Goval Burn fish populations due to risk of direct mortality caused by sediment release. Fragmentation and isolation due to temporary barriers, and disturbance from noise and vibration could prevent breeding, impede migration and kill eggs. These potential impacts would also be of Major significance. There may also be loss of spawning areas upstream of the burn due to fragmentation of the habitat.

Operation

10.4.99 Potential pollution due to sediment release and/or polluted material through road runoff and fragmentation due to isolation are assessed as being of Major significance to the River Don and the Goval Burn.

Section NL5

10.4.100 No potential impacts of Moderate or greater significance are predicted in this section.

Freshwater Habitats

10.4.101 Locations and chainages of culverts/crossings referred to are listed in Table 10.15, and described further in Chapter 9 (Water Environment).

Section NL1

10.4.102 No potential impacts of Moderate or greater significance are predicted in this section.

Section NL2

Construction

10.4.103 Culvert crossings of Gough Burn, Craibstone Burn, and three crossings and realignment of Green Burn are proposed. There would be impacts of Moderate significance to these burns caused by potential pollution from sediment release leading to short-term loss of instream habitat complexity.

Operation

10.4.104 Potential pollution due to sediment release and/or polluted material through road runoff is a Moderate significant impact, causing long term loss of instream habitat complexity to the above burns.

Section NL3

Construction

10.4.105 Six culverts and realignment at Bogenjoss Burn are proposed. There would be impacts of Moderate significance to this burn caused by potential pollution due to sediment release: causing short-term loss of instream habitat complexity.

Operation

10.4.106 Pollution due to sediment release and/or polluted material through road runoff would constitute a Moderate significant potential impact causing long term loss of instream habitat complexity to Bogenjoss Burn.

Section NL4

Construction

10.4.107 There is a proposed bridge spanning the River Don and floodplain and three proposed bridges spanning the Goval Burn. There would be impacts of Moderate significance to these waterbodies caused by potential sediment pollution causing short-term loss of instream habitat complexity.

Operation

10.4.108 Pollution due to sediment release and/or polluted material through road runoff would constitute a Moderate significant potential impact causing long-term loss of instream habitat complexity to the River Don and Goval Burn.

Section NL5

10.4.109 No impacts of Moderate or greater significance were identified for fish in this section.

Overall Significance of Potential Impacts

Section NL1

10.4.110 There are potential impacts of Major significance in the area surrounding the bat roosts in Fairley Home Farm and Derbeth Farm, with impacts of Moderate significance at Kepplehill Burn, Kepplestone, Gough Burn and Newhills Woods area. There would be impacts of Moderate

significance for badger in the areas south of Brimmond Hill due to the presence of an outlier sett and loss of foraging habitat. Wintering birds may suffer impacts of Moderate significance in the Kepplestone and Gough Burn areas.

Section NL2

10.4.111 There would be impacts of Major significance for red squirrels and Moderate significance for bats in the area of Craibstone Campus. These are in the Craibstone Burn and Green Burn area for bats and Newhills North, SAC Craibstone, West Woods and Parkhead woods for red squirrels. There would be impacts of Moderate significance at Gough Burn, Craibstone Campus, Craibstone Burn due to terrestrial habitat loss. There would be impacts of Moderate significance at Craibstone campus for both breeding and wintering birds and badger. There would be impacts of Moderate significance for otter at Gough, Craibstone and Green Burns and Craibstone Pond. Impacts at these burns were also of Moderate significance for fish and freshwater habitats.

Section NL3

10.4.112 There would be impacts of Major significance at Bogenjoss Burn and Kirkhill Forest for red squirrels and badgers and Moderate significance for bats; largely due to fragmentation of woodland habitat. There are Moderate impacts for terrestrial habitats, breeding and wintering birds, fish and freshwater habitats. For otters, there remains Moderate impacts at Bogenjoss. Standingstones Wood, East Woodlands, and Monument Wood again have impacts of Major significance for red squirrels and bats largely due to fragmentation and Moderate impacts for breeding and wintering birds. Standingstones Wood and Farmland between Newton and Corsehill are of Moderate significance for terrestrial habitat loss.

Section NL4

10.4.113 There would be impacts of Major significance at the River Don and Goval Burn for bats, otters and fish and Major significance impacts at Goval Belt for squirrels and bats. There were impacts of Moderate significance at these watercourses for badgers, breeding and wintering birds and terrestrial and freshwater habitats. The Mill Lade would have impacts of Moderate significance for terrestrial habitats, bats (including Parkhill Estate), breeding and wintering birds and otters. The impact on the Formartine and Buchan Way (DWS) is of Moderate significance to terrestrial habitat and bats.

Section NL5

10.4.114 There would be impacts of Major significance at Corby Loch for terrestrial habitats, breeding and wintering birds and, indirectly otters. There are also impacts of Major significance for red squirrels at Corsehill Wood and Littlejohn's Wood with impacts due to construction of Major significance in Goval Belt. These woodlands and Cranfield tree lines are of Moderate impact significance for bats. Red Moss Burn, Middlefield Burn and Blackdog Burn have impacts of Moderate significance for otters. The impacts in the area surrounding Harehill is of Moderate significance for badgers.

Table 10.11 - Summary of Potential Construction Impacts on Habitats and Species

Ecological Receptor	Area	Habitat Areas	Evaluation	Impact	Impact Magnitude	Impact Significance
Section NL1						
Badgers	Agricultural land to the E of Brimmond Hill	N2, N8 and N13	County	Risk of direct mortality due to clearance for construction (outlier sett Group NB).	High	Moderate
Bats	Newton Farm	N11	Regional	Disturbance of historical roost dur to contruction of North Kingswells Junction and distruption of flightlines at Ashtown Road	Medium	Moderate
	Kepplestone Farm and Kepplehill Burn Newhills Wood	N12 and N13 N16	County	Disturbance	Medium	Moderate
				Potential pollution of Kepplehill Burn	Medium	Moderate
Section NL2						
Terrestrial Habitats	Craibstone Burn	N24	County	Temporary habitat loss of riparian habitats.	High	Moderate
	Gough Burn and Craibstone Campus	N24 – N26	County	Temporary habitat loss, disturbance and fragmentation and potential pollution of habitat due to runoff and particulates into aquifers and adjacent land.	Medium	Moderate
Badger	Craibstone	N26-N28	County	Direct mortality due to clearance of outlier sett (NC6).	High	Moderate
Bats	Gough Burn Craibstone golf course Craibstone Campus Craibstone Burn and Pond Green Burn Craibstone Campus	N18 and N24 N19 N25 N26 N27 N28	County	No known roosts to be destroyed, but there is potential direct mortality during clearance for construction, including trees and buildings, particularly Sunnyside cottages.	High	Moderate
				Disturbance and fragmentation of roost habitats and foraging corridors and potential pollution of aquifers due to runoff particularly Gough, Craibstone and Green Burn.	Medium	Moderate
Breeding Birds	Craibstone Campus Craibstone Burn and Pond	N25 N26	County	Risk of direct mortality due to habitat clearance, temporary fragmentation, disturbance and potential pollution to Parkhead Burn, Craibstone Burn and Craibstone Pond due to accidental spills.	Medium	Moderate
	Green Burn	N27	County	Direct mortality due to habitat clearance and disturbance.	Medium	Moderate
				Potential pollution to Green Burn due to accidental spills.	Medium	Moderate
				Disturbance during construction.	Medium	Moderate
Otters	Gough Burn Craibstone Burn Green Burn	N14, N15, N17, N18 and N24 N21, N24-N26, N28 N22, N23 and N30	Regional	Direct mortality, temporary habitat loss, disturbance and fragmentation due to culverting (and realignment of Green Burn) of riparian habitat and wildlife corridors, with potential pollution due to particulates.	High	Major
Red Squirrels	Craibstone Wood South Craibstone Wood North	N24 (woodland W2) N25 (woodland W3))	Regional	Direct mortality during clearance for construction	High	Major
				Temporary disturbance	Medium	Moderate
Fish	Gough Burn	N14, N15, N17, N18 and N24		Direct mortality caused by pollution due to release of sediment during culvert construction, which may damage or kill fish. Fragmentation and isolation due to fish stranding during culvert construction.	Medium	Moderate

Ecological Receptor	Area	Habitat Areas	Evaluation	Impact	Impact Magnitude	Impact Significance
Fish [cont'd]	Craibstone Burn	N21, N25, N26 and N28	County	Risk of direct mortality caused by pollution due to release of sediment during culvert construction, which may damage or kill fish. Fragmentation and isolation due to fish stranding during culvert.	see above	see above
	Green Burn	N22, N23, N28 and N30		Risk of direct mortality caused by pollution due to release of sediment during culvert construction, which may damage or kill fish. Fragmentation and isolation due to fish stranding during construction of three culverts, prevention of migration upstream results in spawning habitat loss.		
Freshwater Habitats	Gough Burn	N14, N15, N17, N18 and N24	Regional	Pollution due to release of sediment during culvert construction and short-medium term loss in-stream habitat complexity.	Medium	Moderate
	Craibstone Burn	N21, N25, N26 and N28		Pollution due to release of sediment during culvert construction and short-medium term loss of in-stream habitat complexity.		
	Green Burn	N22, N23, N28 and N30		Pollution due to release of sediment during culvert construction and short-medium term loss of in-stream habitat complexity.		
Section NL3						
Terrestrial Habitats	Agricultural land surrounding Howemoss Kirkhill Forest and Standingstones Wood	N32 and N33 N35,,N37	County	Temporary habitat loss, disturbance and fragmentation and potential pollution of woodlands. Hydrological impacts to marshy grassland.	Medium	Moderate
	Bogenjoss Burn	N38, N42		Temporary habitat loss and fragmentation and potential pollution of riparian habitat. Hydrological impacts upon wetland habitat surrounding the area.		
Badgers	Howemoss, Kirkhill Forest, Standingstones Wood, East Woodlands, Monument Wood and Bogenjoss Burn	N33-N35,N37, N39, N41-N44 and N46-N47	Regional	Risk of direct mortality during clearance for construction, loss of four setts for group NE (one main sett) one sett for NG and four setts for NH (one main sett)	High	Major
Bats	Standingstones Wood, Kirkhill Forest North, East Wood, Monument Wood and Bogenjoss Burn	N35-N39, N42-N43, N45 and N47	County	No known roosts to be destroyed but potential direct mortality during clearance for construction.	High	Moderate
				Disturbance and fragmentation of potential roosts and foraging corridors. Pollution due to particulates of Bogenjoss Burn	Medium	Moderate
	Farburn Wood (DWS)	N36	County	Fragmentation of foraging corridors.	Medium	Moderate
Breeding Birds	Agricultural land surrounding Howemoss and Kirkhill Forest	N32, N33 & N37	County	Potential pollution to Howemoss Burn and Bogenjoss Burn due to accidental spills.	Medium	Moderate
	Bogenjoss Burn and Monument Woods	N41 & N42		Risk of direct mortality due to habitat clearance, temporary fragmentation, disturbance and potential pollution to Bogenjoss Burn due to accidental spills.		
	East Woodlands	N43		Potential pollution to Bogenjoss Burn due to accidental spills.		
Otters	Bogenjoss Burn	N37-N45	Regional	Risk of direct mortality, disturbance and fragmentation due to crossing and realignment of riparian habitat and wildlife corridors, with potential pollution due to particulates of Bogenjoss Burn.	High	Major

Ecological Receptor	Area	Habitat Areas	Evaluation	Impact	Impact Magnitude	Impact Significance
Red Squirrels	Kirkhill Forest South, Standingstones Wood North East Woodlands Bogenjoss Burn	N34-N35 N43 N37 N42 and N45	National	Risk of direct mortality during clearance for construction.	High	Major
				Disturbance during construction.	Low	Moderate
	Monument Wood	N47	Regional	Risk of direct mortality during clearance for construction.	Medium	Moderate
Brown Hare	Agricultural land surrounding Howemoss	N33	County	Temporary habitat loss, disturbance and Fragmentation.	Medium	Moderate
Fish	Bogenjoss Burn	N37, N38, N40-N42, N45	County	Risk of direct mortality caused by pollution due to release of sediment during culvert construction (six), which may damage or kill fish. Fragmentation and isolation due to fish stranding during construction of six culverts, prevention of migration upstream, resulting in spawning habitat loss.	Medium	Moderate
Freshwater	Bogenjoss Burn	N37, N38, N40-N42, N45	Regional	Pollution due to release of sediment during realignment and culvert construction and short-medium term loss of in-stream habitat complexity.	Medium	Moderate
Section NL4						
Terrestrial Habitats	River Don	N52	Regional	Disturbance and fragmentation of wildlife corridors and potential pollution of aquifers.	Medium	Moderate
	Goval Burn and the Mill Lade Formartine and Buchan Way (DWS)	N52 and N61 N62	County			
Badgers	Goval Burn and the Mill Lade	N54, N60, N62 and N67	County	Risk of direct mortality during clearance of two setts (Group NK) for construction.	High	Moderate
Bats	Banks of the River Don	N52	National	Risk of direct mortality during clearance for construction, Fragmentation disturbance and potential pollution of the River Don due to particulates.	High	Major
	Goval Burn and the Mill Lade	N61	Regional	Risk of direct mortality during clearance for construction, fragmentation and disturbance of existing roost at Parkhill Pumping Station.	High	Major
				Disturbance and fragmentation of roosts, foraging and commuting corridors, Pollution of Goval Burn and the Mill Lade due to particulates.	Medium	Moderate
	Agricultural land surrounding railway Formartine and Buchan Way (DWS) Agricultural fields to the north of Meadow Head Goval Farm, Goval Wood, Goval Belt and surrounding agricultural fields Parkhill Estate	N49-N50 N60 N62 N69 N54, N58 N63	County	No known roosts to be felled, but potential direct mortality during clearance for construction.	High	Moderate
				Disturbance and fragmentation of roosts, foraging and commuting corridors.	Medium	Moderate
	Skate Wood	N65	County	Disturbance and fragmentation of foraging corridors.	Medium	Moderate
Breeding Birds	River Don (DWS)	N52	County	Risk of direct mortality due to habitat clearance, temporary fragmentation and disturbance.	Medium	Moderate
				Potential pollution to the River Don due to accidental spills.	High	Moderate
	Goval Burn and the Mill Lade	N61	County	Potential pollution to Goval Burn due to accidental spills.	Medium	Moderate

Ecological Receptor	Area	Habitat Areas	Evaluation	Impact	Impact Magnitude	Impact Significance
Wintering Birds	Area in Nether Kirkton surrounding the River Don (DWS) and River Don DWS	N50,N51 and N52	Regional	Risk of direct mortality due to clearance of habitat for construction, temporary habitat loss, disturbance, fragmentation and potential pollution of the River Don.	Medium	Moderate
Otters	River Don	N52	National	Fragmentation and disturbance of a holt during construction.	High	Major
	Goval Burn	N54, N55, N59-N61	National	Risk of direct mortality during clearance for construction of one holt and lying up sites. Disturbance of three holt and lying up sites and potential pollution due to particulates.	High	Major
	Mill Lade	N55	Regional	Fragmentation and disturbance and potential pollution due to particulates.	Medium	Moderate
	Corsehill Burn	N64, N6, N68, N70	County	Disturbance and fragmentation of habitat including loss of prey due to realignment of Corsehill Burn.	Medium	Moderate
Fish	River Don	N52	National	Fragmentation and isolation due to physical barriers (such as velocity increases due to bridge footings or concrete apron) may prevent migration upstream resulting in spawning habitat loss. Disturbance from noise and vibration during bridge construction could damage fish hearing, impede migration or kill young eggs. Risk of direct mortality caused by pollution due to release of sediment during construction, which may damage or kill salmonids.	High	Major
	Goval Burn	N54, N55, N59-N61	Regional	Fragmentation and isolation due to physical barriers (such as velocity increases due to bridge footings or concrete apron) may prevent migration upstream resulting in spawning habitat loss. Disturbance from noise and vibration during bridge construction could damage fish hearing, impede migration or kill.	High	Major
				Direct mortality caused by potential pollution due to release of sediment during construction, which may damage or kill salmonids.	Medium	Moderate
Freshwater	River Don	N52	National	Pollution due to release of sediment during bridging construction and short-medium term loss of in-stream habitat complexity.	Medium	Major
	Goval Burn	N54, N55, N59-N61	County	Pollution due to release of sediment during bridging and short-medium term loss of in-stream habitat complexity.	Medium	Moderate
Section NL5						
Terrestrial Habitats	Corby and Lily Lochs (SSSI, DWS, SINS complex with Bishop's Loch)	N85	National	Fragmentation and disturbance of wetland habitats with hydrological disruption and potential pollution of the lochs.	Medium	Major
	Littlejohns Wood	N72	County	Fragmentation and disturbance of woodland habitats, potential pollution	Medium	Moderate
Badgers	Littlejohn's Wood and Harehill	N67, N85, N91 and N93-N94	County	Direct mortality during clearance of setts (one outlier sett NO6) for construction.	High	Moderate

Ecological Receptor	Area	Habitat Areas	Evaluation	Impact	Impact Magnitude	Impact Significance
Bats	Cranfield treelines and treelines surrounding Harehill	N90, N91	County	Direct mortality one roost between Cranfield and Harehill.	High	Moderate
				Disturbance to potential roosts and fragmentation of foraging corridors.	Medium	Moderate
	Corsehill Wood Littlejohn's Wood Woodland at Red Moss Moss Belt Plantation Loch Hills Quarry Fields surrounding Loch Greens Farm	N71 N72 N74 N80 N84 and N87	County	No known roosts, but increased risk of direct mortality of potential roosts during clearance for construction.	High	Moderate
				Disturbance and fragmentation of roosts and foraging corridors	Medium	Moderate
	Corby and Lily Lochs	N85	County	Potential pollution of aquifers including Red Moss, Corby and Lily Loch.	Medium	Moderate
Breeding Birds	Agricultural fields South of Lochgreens Farm and between Lochgreens Road / Gravel Pit	N84 and N87	County	Potential pollution to Red Moss Burn and Corby Loch due to accidental spills.	High	Moderate
	Corby and Lily Lochs (SSSI, DWS, SINS)	N85	Regional	Disturbance.	Medium	Moderate
				Potential pollution to Red Moss Burn and Corby Loch due to accidental spills.	High	Major
Wintering Birds	Corby and Lily Lochs	N85	National	Fragmentation, disturbance and potential pollution from accidental spills.	Low	Moderate
Otters	Corby and Lily Lochs N85	N85	National	Potential pollution of the Lochs.	High	Major
	Blackdog Burn	N91, N93-N95	Regional	Disturbance during clearance for construction	Medium	Moderate
	Red Moss Burn	N82-N87	County	Risk of direct mortality and disturbance during clearance for construction	High	Moderate
Red Squirrels	Corsehill Wood Littlejohn's Wood	N71 (W8) N72 (W8)	Regional	Risk of direct mortality during clearance for construction and fragmentation of habitat.	High	Major
				Disturbance due to construction.	Medium	Moderate
Terrestrial Inverts	Corby Loch	N84-N85	Regional	Potential hydrological disruption.	Medium	Moderate

Table 10.12 - Summary of Potential Operational Impacts on Habitats and Species

Ecological Receptor	Area	Habitat Areas	Evaluation	Impact	Impact Magnitude	Impact Significance
Section NL1						
Badgers	Agricultural land to the east of Brimmond Hill	N2, N8 and N13	County	Risk of direct mortality due to RTAs.	High	Moderate
				Habitat loss of setting and foraging habitat, disturbance and fragmentation of territory for two social groups (NA and NB).		
Bats	Newton Farm Newhills Wood	N11, N16	Regional	Risk of direct mortality due to RTAs between roost and foraging sites.	High	Major
				Disturbance due to lighting, fragmentation of foraging corridors.	Medium	Moderate
	Kepplestone Farm Kepplehill Burn Gough Burn Newhills Woods	N12 N13 N14 N16	County	Disturbance and fragmentation of roost habitats and commuting routes and potential pollution of aquifers due to runoff.	Medium	Moderate
Wintering Birds	Agricultural fields surrounding Kepplestone Farm, Gough Burn, Newhills Wood, Agricultural fields and Cemetery at Newhills	N11-N17	County	Risk of direct mortality due to RTAs between foraging sites, permanent habitat loss and fragmentation, disturbance and potential pollution of aquifers from runoff.	Medium	Moderate
Otters	Kepplehill Burn	N11-N13	County	Risk of direct mortality due to RTAs and/or drowning due to culverting.	High	Moderate
				Disturbance due to noise, fragmentation of habitat and potential pollution of aquifers due to runoff.	Medium	Moderate
Section NL2						
Terrestrial Habitats	Craibstone Burn Gough Burn and Craibstone Campus	N24 N24 - N26	County	Disturbance and fragmentation, potential pollution due to runoff and particulates into aquifers and adjacent land.	Medium	Moderate
				Permenant habitat loss of pond and stream habitats	High/Medium	
Badgers	Craibstone Campus	N26-N28	County	Potential direct mortality due to RTAs.	High	Moderate
				Disturbance and fragmentation of Social Group NC.		
				Habitat loss of setting and foraging habitat and fragmentation of territory (Social Group NC)	Medium	
Bats	Gough Burn Craibstone golf course Craibstone Campus Craibstone Burn and Pond Green Burn Craibstone Campus Woodland north of Parkhead	N18 and N24 N19 N25 N26 N27 N28 N23	County	Risk of direct mortality due to RTAs between foraging sites.	High	Moderate
				Habitat loss, disturbance and fragmentation of roost habitats and foraging corridors. potential pollution of aquifers due to runoff, particularly Gough, Craibstone and Green Burns.	Medium	Moderate

Ecological Receptor	Area	Habitat Areas	Evaluation	Impact	Impact Magnitude	Impact Significance
Breeding Birds	Craibstone Campus and Craibstone Burn/Pond	N25 N26	County	Risk of direct mortality due to RTAs, permanent habitat loss and fragmentation, disturbance and potential pollution to Parkhead Burn, Craibstone Burn and Craibstone Pond due to runoff.	Medium	Moderate
	Green Burn	N27		Risk of direct mortality from RTAs, permanent habitat loss and disturbance.	Medium	Moderate
				Potential pollution to Green Burn due to runoff.	Medium	Moderate
Wintering Birds	Agricultural fields and woodland in and surrounding Craibstone SAC, and Craibstone Burn / Pond	N18-N20 N23-N26 & N28	County	Risk of direct mortality due to RTAs between foraging sites, permanent habitat loss and fragmentation, disturbance and potential pollution of aquifers from runoff.	Medium	Moderate
Otters	Gough Burn Craibstone Burn Green Burn	N4 N15, N17, N18, N24 N21, N25, N26, N28 N23, and N30	Regional	Risk of direct mortality due to RTAs and/or drowning where culverted between foraging sites, along with potential pollution of aquifers due to runoff and habitat fragmentation are high negative impacts.	High	Major
				Permanent habitat loss due to burn realignment	Medium	Moderate
	Craibstone Pond	N26	County	Risk of direct mortality due to RTAs and/or drowning where culverted between foraging sites, along with potential pollution of aquifers due to runoff and habitat fragmentation are high magnitude impacts.	High	Moderate
				Permanent habitat loss due to burn realignment, habitat fragmentation of otter movements and potential pollution due to runoff	Medium	Moderate
Red Squirrels	Craibstone Wood South Craibstone Wood North	N24 (woodland 2) N25 (woodland 3)	Regional	Risk of direct mortality due to RTAs and fragmentation of habitat may result in isolation of these populations and ultimately extinction in these areas.	High	Major
				Habitat loss of foraging and breeding habitat. Disturbance in these areas may cause squirrels to abandon habitat.	Medium	Moderate
Fish	Gough Burn Craibstone Burn Green Burn	N14, N15, N17, N18, N21, N23-N26, N28, N30	County	Increased risk of direct mortality caused by pollution due to release of sediment during culvert construction, which may damage or kill fish. Fragmentation and isolation due to fish stranding during culvert construction.	Medium	Moderate
Freshwater	Gough Burn Craibstone Burn Green Burn	N14, N15, N17, N18, N21, N23-N26, N28, N30	Regional	Pollution due to road runoff carrying sediment load and heavy metals may cause long-term decreased habitat complexity for leading to localised changes in invertebrate distributions. Permanent habitat loss of bankside vegetation	Medium	Moderate
Section NL3						
Terrestrial Habitats	Agricultural land surrounding Howemoss Kirkhill Forest South and Standingstones Wood	N32 and N33 N35, N37	County	Permanent habitat loss of farmland and 13-14 dry stone walls. Disturbance, fragmentation and potential pollution of woodlands. Hydrological impacts upon wetland habitat.	Medium	Moderate
	Bogenjoss Burn	N38, N42		Permanent habitat loss and fragmentation and potential pollution of riparian habitat due to runoff.		

Ecological Receptor	Area	Habitat Areas	Evaluation	Impact	Impact Magnitude	Impact Significance
Badgers	Howemoss, Kirkhill Forest, Standingstones Wood, East Woodlands, Monument Wood DWS and Bogenjoss Burn	N33-N35,N37, N39, N41-N44 and N87-N47	Regional	Risk of direct mortality due to RTAs.	High	Major
				Habitat loss of setting and of foraging habitat, disturbance and severe fragmentation of territory (Groups ND, NE, NF, NG and NH) and of Bogenjoss Burn as a wildlife corridor.		
Bats	Kirkhill Forest North, Farburn Wood (DWS), East Wood, Monument Wood and Bogenjoss Burn	N35-37, N42-43, N45, N47	County	Risk of direct mortality due to RTAs casued by severance of flight lines.	Medium	Moderate
	Standingstones Wood, Kirkhill Forest North, East Wood, Monument Wood and Bogenjoss Burn	N33, N35-N43, and N45-N47	County	Habitat loss, disturbance (not N33) and fragmentation of potential roosts and foraging corridors and potential pollution of Bogenjoss Burn.	Medium	Moderate
	Farburn Wood (DWS)	N36		Fragmentation of foraging corridors.	Medium	Moderate
Breeding Birds	Agricultural land surrounding Howemoss	N32 & N33	County	Potential pollution to Howemoss Burn due to runoff.	Medium	Moderate
	Kirkhill Forest	N37		Risk of direct mortality due to RTAs, permanent habitat loss and fragmentation, disturbance and potential pollution to Bogenjoss Burn due to runoff.		
	Bogenjoss Burn , Monument Woods and East Woodlands	N41, N42 & N43		Risk of direct mortality due to RTAs, permanent habitat loss and fragmentation (excluding N43 with respect to fragmentation), disturbance and potential pollution to Bogenjoss Burn due to accidental spills.		
Wintering Birds	Woodland and agricultural surrounding Howemoss	N30, N31, N32, N33 & N39	County	Risk of direct mortality due to RTAs between foraging sites, permanent habitat loss and fragmentation, disturbance and potential pollution of aquifers from runoff.	Medium	Moderate
	Woodland at Standingstones Wood, Kirkhill Forest, Bogenjoss Burn and Lower Overton Wood	N34, N35 N37, N38, N39 & N40	County	Risk of direct mortality due to RTAs between foraging sites, permanent habitat loss and fragmentation, disturbance and potential pollution of aquifers from runoff.		
	Agricultural fields and Woodland at Bogenjoss Burn	N41-N48	Regional	Risk of direct mortality due to RTAs between foraging sites, permanent habitat loss and fragmentation, disturbance and potential pollution of aquifers from runoff.		
Otters	Bogenjoss Burn	N37,N38, N40-N42, N45	Regional	Risk of direct mortality due to RTAs and/or drowning where culverted between foraging sites.	High	Major
				Disturbance due to noise and permanent habitat loss due to burn realignment.	Medium	Moderate
				Fragmentation of habitat and potential pollution of aquifers.	High	Major
	Howemoss Field Ditch Walton Field Ditch	N33 N30	County	Risk of direct mortality due to RTAs and/or drowning where culverted between foraging sites.	High	Moderate
Red Squirrels	Kirkhill Forest South Standingstones Wood East Woodlands	N37 (woodland 5) N35 (woodland 12) N43 (woodland 6)	National	Risk of direct mortality due to RTAs between foraging sites. Fragmentation potentially affecting the viability of the population.	High	Major
				Permanent habitat loss and disturbance	Low	Moderate

Ecological Receptor	Area	Habitat Areas	Evaluation	Impact	Impact Magnitude	Impact Significance
Red Squirrels [cont'd]	Monument Wood	N47 (woodland 7)	Regional	Risk of direct mortality due to RTAs between foraging sites. Fragmentation potentially affecting the viability of the population.	High	Major
				Disturbance may cause squirrels to abandon habitat.	Medium	Moderate
Brown Hare	Agricultural land surrounding Howemoss	N33	County	Permanent habitat loss, disturbance and fragmentation.	Medium	Moderate
Fish	Bogenjoss Burn	N37,N38, N40-N42, N45	County	Pollution due to input of sediment or pollutants from road runoff would affect the currently excellent water quality. Fragmentation and isolation due to fish stranding during construction of six culverts, prevention of migration upstream, Habitat Loss of spawning grounds.	Medium	Moderate
Freshwater	Bogenjoss Burn	N37,N38, N40-N42, N45	Regional	Pollution due to runoff and change in discharge regime carrying sediment load and heavy metals may cause long-term decreased habitat complexity leading to localised changes in invertebrate distributions.	Medium	Moderate
Section NL4						
Terrestrial Habitats	River Don	N52	Regional	Permanent habitat loss of riparian and linear habitats, disturbance and fragmentation of wildlife corridors and potential pollution of the River Don, Goval Burn and the the Mill Lade.	Medium	Moderate
	Goval Burn and the Mill Lade Formartine and Buchan Way (DWS)	N61 N62	County			
	Skate Wood (Important Local Wildlife Site - Scottish Wildlife Action Project	N65	County	Fragmentation.	Medium	Moderate
Badgers	Goval Burn and the Mill Lade	N54, N60, N62 and N67	County	Increased risk of direct mortality due to RTAs.	High	Moderate
				Habitat loss of setting and of foraging habitat, disturbance and fragmentation of territory (Groups NI, NJ, NK and NL) and riparian commuting habitat along Goval Burn.		
Bats	Banks of the River Don	N52	National	Risk of direct mortality due to RTAs. Fragmentation, disturbance and pollution of the River Don due to runoff.	High	Major
	Goval Burn and the Mill Lade	N61	Regional	Risk of direct mortality due to RTAs	High	Major
				Disturbance and fragmentation of roosts, foraging and commuting corridors and potential pollution of Goval Burn, Goval Reservoir and the Mil Lade.	Medium	Moderate
	Agricultural land surrounding railway and Dyce Road. Formartine and Buchan Way. Fields north of Meadow-head Goval Farm, Wood, Belt and surrounding agricultural fields Parkhill Estate	N49-N50 N62 N69 N53-N54, N58 N60 N63	County	Increased risk of direct mortality due to RTAs.	High	Moderate
				Disturbance and fragmentation of roosts, habitat loss, foraging and commuting corridors and potential pollution of Goval Burn and the Mill Lade.	Medium	Moderate

Ecological Receptor	Area	Habitat Areas	Evaluation	Impact	Impact Magnitude	Impact Significance
Breeding Birds	River Don (DWS)	N52	County	Potential pollution to the River Don due to runoff.	High	Moderate
	Goval Burn and the Mill Lade	N61		Risk of direct mortality due to RTAs, permanent habitat loss, disturbance and potential pollution to Goval Burn from runoff.	Medium	Moderate
Wintering Birds	Farmland surrounding the River Don and River don DWS	N49, N50, N51, N52 & N54	Regional	Risk of direct mortality due to RTAs between foraging sites, permanent habitat loss and fragmentation (excluding N49), disturbance and potential pollution of River Don from runoff.	Medium	Moderate
	Agricultural fields and Woodland to the West and South of Goval Burn and Goval Mill Lade	N55, N58, N60, N61, N62, N63 & N64	County	Risk of direct mortality due to RTAs between foraging sites, permanent habitat loss and fragmentation), disturbance and potential pollution of Goval Burn and the Mill Lade from runoff.		
	Agricultural fields and Woodland to the East and South East of Goval Burn and Goval Mill Lade	N67, N68, N69 & N70	Regional	Risk of direct mortality due to RTAs between foraging sites, permanent habitat loss and fragmentation (excluding N49), disturbance and potential pollution of Goval Burn and the Mill Lade from runoff		
Otters	River Don	N52	National	Risk of direct mortality due to RTAs between foraging sites. Fragmentation of the major commuting corridor. Potential pollution to the River Don.	High	Major
	Goval Burn	N54, N55, N59-N61	National	Risk of direct mortality due to RTAs between foraging sites. Habitat loss of high value riparian and wildlife corridor habitat including lying up sites due to culverting realignment. Fragmentation of the major commuting corridor. Potential pollution to Goval Burn.	Medium - High	Major
	Mill Lade	N55	Regional	Risk of direct mortality due to RTAs between foraging sites. Fragmentation of the major commuting corridor. Potential pollution to the Mill Lade.	High	Major
	Corsehill Burn	N64 and N66	County	Potential pollution and direct mortality due to RTAs between foraging sites.	High	Moderate
				Habitat loss of prey habitat due to realignment and fragmentation of commuting routes.	Medium	Moderate
Fish	River Don	N52	National	Fragmentation and isolation due to physical barriers may prevent migration upstream and lead to spawning habitat loss. Pollution due to input of sediment or pollutants from road runoff would affect the currently good (A2) water quality.	High	Major
	Goval Burn	N54, N55, N59-N61	Regional	Fragmentation and isolation due to physical barriers leading to spawning habitat loss.	High	Major
				Pollution due to input of sediment or pollutants from road runoff would affect the currently good (A2) water quality.	Medium	Moderate

Ecological Receptor	Area	Habitat Areas	Evaluation	Impact	Impact Magnitude	Impact Significance
Freshwater	River Don	N52	National	Pollution due to road runoff carrying sediment load and heavy metals may cause long-term decreased habitat complexity for leading to localised changes in invertebrate distributions.	Medium	Major
	Goval Burn	N54, N55, N59-N61	County	Pollution due to road runoff carrying sediment load and heavy metals may cause long-term decreased habitat complexity for leading to localised changes in invertebrate distributions.	Medium	Moderate
Section NL5						
Terrestrial Habitats	Corby and Lily Lochs (SSSI, DWS, SINS complex with Bishop's Loch)	N85	National	Fragmentation and disturbance of wetland habitats and potential pollution of aquifers due to runoff.	Medium	Major
	Littlejohns Wood	N72	County	Habitat loss and fragmentation of woodland habitats, potential pollution of aquifers	Medium	Moderate
Badgers	Littlejohn's Wood and Harehill	N67, N85, N91 and N93-N94	County	Risk of direct mortality due to RTAs.	High	Moderate
				Habitat loss of setting and of foraging habitat. Fragmentation and disturbance to Social Groups NL, NM, NN and NO.	High	Moderate
Bats	Cranfield treelines and treelines surrounding Harehill Cranfield treelines	N91 N90	County	Risk of direct mortality due to RTAs.	High	Moderate
				Disturbance and fragmentation of roosting habitat and foraging corridors.	Medium	Moderate
	Corsehill Wood Littlejohn's Wood Woodland at Red Moss Moss Belt Plantation Loch Hills Quarry Fields surrounding Loch Greens Farm Moss Belt agricultural areas Red Moss Corby and Lily Lochs Newton of Shielhill woodland	N71 N72 N74, N78- 79 N80 N84 and N87 N78 N82 N83 N85 - 86 N88	County	Permanent habitat loss including Loch Greens pond, Disturbance and fragmentation of roosts and foraging / commuting corridors, potential pollution of aquifers including Red Moss, Corby and Lily Loch.	Medium	Moderate
Breeding Birds	Agricultural fields S of Lochgreens Farm	N84	County	Potential pollution to Red Moss Burn and Corby Loch due to runoff.	High	Moderate
	Corby and Lily Lochs (SSSI, DWS, SINS)	N85	Regional	Potential pollution to Red Moss Burn and Corby Loch due to runoff.	High	Major
	Agricultural fields between Lochgreens Road / Gravel Pit	N87	County	Risk of direct mortality due to RTAs, permanent habitat loss and fragmentation, disturbance and potential pollution to Red Moss Burn and Corby Loch due to runoff.	Medium	Moderate

Ecological Receptor	Area	Habitat Areas	Evaluation	Impact	Impact Magnitude	Impact Significance
Wintering Birds	Woodland at Red Moss, North of B977	N74	Regional	Risk of direct mortality due to RTAs between foraging sites, permanent habitat loss and fragmentation and disturbance potential pollution of ground water from runoff.	Medium	Moderate
	Area around Lochgreens Farm	N80, N81, N83, N86 & N87	Regional	Risk of direct mortality due to RTAs between foraging sites, permanent habitat loss and fragmentation and disturbance potential pollution of aquifers from runoff.	Medium	
	Corby and Lily Lochs	N85	National	Disturbance due to fragmentation of habitat and foraging corridors and potential pollution of aquifers.	Low	
	Backhill of Cranbog	N86 and N87	Regional	Disturbance (N86, N88, N89 only). Risk of direct mortality due to RTAs between foraging sites, permanent habitat loss and fragmentation and disturbance potential pollution of ground water from runoff (N90 only)	Medium	
		N88, N89 & N90	County			
	Fifehill	N94, N96 & N97	Regional	Risk of direct mortality due to RTAs between foraging sites, permanent habitat loss and fragmentation and disturbance potential pollution of ground water from runoff.	Medium	
		N93	County			
Otters	Corby and Lily Lochs	N85	National	Potential pollution of aquifers due to runoff	High	Major
	Blackdog Burn	N91, N93-N95	Regional	Risk of direct mortality due to RTAs and fragmentation, dsturbance and potential pollution of the Burn.	High	Major
	Blackdog Ditch	N94	County	Increased risk of direct mortality through RTAs where the scheme crosses ditch.	High	Moderate
				Risk of deterioration in water quality due to runoff from the scheme. Otters are only likely to use the ditch on an infrequent basis but the fact that it flows into Blackdog Burn, would increase the magnitude of a pollution incident	Medium	Moderate
	Red Moss Burn	N82-N87	County	Risk of direct mortality due to RTAs and fragmentation; potential pollution of the burn.	High	Moderate
	Middlefield Burn	N82-N87	County	Risk of direct mortality due to RTAs	High	Moderate
				Potential pollution of the burn.	Medium	Moderate
Red Squirrels	Corsehill Wood Littlejohns Wood	N71 (W8) N72 (W8)	Regional	Risk of direct mortality due to RTAs between foraging sites and fragmentation potentially affecting the viability of the population.	High	Major
				Permanent habitat loss and disturbance to these areas.	Medium	Moderate

10.5 Mitigation

Introduction

10.5.1 The principles and objectives for ecological mitigation associated with the AWPR have been developed in discussion with SNH, SEPA and other stakeholders including Transport Scotland, Aberdeenshire Council and Aberdeen City Council. These are reported in a Mitigation Vision Statement (Jacobs, 2007). The statement provides a framework to facilitate the development of mitigation measures to address specific impacts. It also outlines proposals for habitat creation outside the study area to offset cumulative habitat loss and fragmentation impacts throughout the proposed scheme.

10.5.2 Therefore, this section aims to set out the key objectives for ecological mitigation associated with the AWPR. These follows a hierarchical approach:

- to avoid adverse impacts in the first instance, for example by not pursuing a particular option, or by devising alternatives where possible;
- where avoidance is not possible, reduce the adverse impacts with the aim of eliminating impacts and reducing each impact to being of negligible significance;
- where adverse residual impacts remain, measures to offset the adverse impacts at the specific site may be required. For example, habitat creation may be required to offset the local, site-specific impacts associated with habitat loss and fragmentation; and
- where localised site-specific mitigation may not be possible through habitat creation or where such measures would be ineffective, it may be possible, with the agreement of statutory consultees, to offset adverse impacts at a a wider, regional level. Such measures may include, for example, habitat creation and/or restoration at sites remote from the point of impact or contributions to strategies that contribute to meeting the targets and objectives of Biodiversity Action Plans (UK or Local BAPs).

10.5.3 Current guidelines highlight the importance of an agreed approach to mitigation prior to the publication of the ES. For example, the Draft IEEM Guidelines for Ecological Impact Assessment (IEEM, 2006) states that 'An EcIA is effectively meaningless if it provides an assessment of the significance of the residual impacts of a scheme based on the proposed mitigation measures being implemented even though these measures have not been agreed by the developer'. Furthermore, DMRB states that the 'aims and objectives of the mitigation and any post construction monitoring should be agreed before the mitigation design process starts'.

10.5.4 The ecological mitigation strategy for the AWPR aims to provide mitigation that reduces the adverse effects of the proposed road, in accordance with UK, Scottish and Local Policies.

10.5.5 Mitigation includes best practice methods and principles that are applied to the scheme as a whole and site-specific mitigation measures applied to individual locations where appropriate. As summarised in the opening paragraph, prevention or avoidance of these adverse impacts is the primary aim of ecological mitigation. If this is not practical or possible, measures will be proposed to reduce the impact and if this is also not practical or possible then measures to offset the impact are included in the mitigation strategy (IEEM, 2006). Offsetting measures may be addressed at strategic level, as discussed in Part E of the ES.

10.5.6 Mitigation measures such as avoiding sensitive times of year, use of appropriate fencing, adopting best practice procedures for site clearance and ensuring adherence to procedure by the Ecological Clerk of Works (ECoW) will provide efficient safeguards from the potential impacts of the works in most cases. Full details of the generic mitigation required for habitats and individual species are provided in Appendices A10.1 to A10.16. A summary of the generic mitigation measures that apply to all ecological receptors across the scheme is presented Table 10.13.

Table 10.13 - Generic Ecological Mitigation Measures

Effect	Generic Mitigation
Avoid	Comply with the requirements of the Ecological Clerk of Works (ECoW) who will be employed on behalf of the Scottish Executive; Ensure that work compounds and access tracks etc are not located in, or adjacent to, areas that maintain habitat value; Establish site fencing to prevent access to areas outside of working areas, particularly in areas adjacent to features of interest/value; Cover site safety issues including storage of potentially dangerous materials; Pre-construction species surveys of impacted areas, particularly breeding sites to remove animals and therefore prevent direct mortality; Covering of pits or provision of mammal ramps to prevent animals falling in holes and becoming trapped; and Follow SEPA pollution prevention guidelines (PPGs) to prevent pollution of watercourses through siltation or chemicals.
Reduce	Restrict workforce to working areas through the erection of fencing, to prevent additional damage; Best practice methods will be followed throughout; Timing of works to minimise disturbance i.e. during the breeding season, night-time, etc.
Offset	In collaboration with landscape mitigation (see Chapter 11), new landscape planting will comprise native species in appropriate locations along verges and on earthwork slopes to aim to create semi-natural habitat such as species-rich grassland, scrub and woodland.

10.5.7 For ecological features, where impacts were assessed as being of Moderate significance or above, further site-specific mitigation measures are considered to be required to minimise the impacts on that receptor to a satisfactory level in accordance with policy guidance.

10.5.8 This approach is considered on a site-by-site basis for those areas with potential (pre-mitigation) impacts of Moderate or above and has been adopted to provide a guiding principle in developing a general mitigation strategy. In some cases, generic and site-specific mitigation may still result in residual impacts. It should be emphasised that the four-point scale for assessing impact significance (Negligible, Minor, Moderate and Major), is designed to be used as a guide for interpreting impacts, and in practice the range of impacts is less simplistic, occuring on a gradual scale. Selected legislation and guidance is presented in Table 10.14.

Table 10.14 - Selected Relevant Extracts from Legislation/Guidance for Mitigation

Mitigation Legislation / Guidance Extracts
Nature Conservation (Scotland) Act 2004, Part 1, Section 1.1: "It is the duty of every public body and office-holder, in exercising any functions, to further the conservation of biodiversity so far as is consistent with the proper exercise of those functions."
Environmental Impact Regulations (Scotland) 1999: Mitigation measures are intended "to prevent, reduce or where possible, offset any significant adverse impacts on the existing ecology and nature and conservation value of the surrounding area."
Design Manual for Roads and Bridges 2001, Volume 10, Section 4: "Avoiding the negative effects of the project should be the first intention of any project. Mitigation should be provided where this is not possible. Mitigation design should be provided on a site-by-site basis, taking account of appropriate survey information. Land taken or disturbed by project works should be minimised, except where there is a need to acquire more extensive areas of land for environmental mitigation. Where practicable, and within the powers and resources of the Overseeing Organisation, opportunities for habitat creation or enhancement and species protection should be taken in addition to providing mitigation. Timing of activities should avoid impacts on protected and rare species and habitats wherever possible. Mitigation design should retain, or wherever possible create, natural habitat links which may act to assist wildlife movements. Special engineering features (e.g. tunnels, ledges, and bridges) combined with fencing where appropriate, can be used to assist in maintaining links across roads."
NPPG14 Natural heritage, Paragraph 74: http://www.scotland.gov.uk/Publications/1999/01/nppg14 "74. Planning authorities should have full regard to natural heritage considerations in determining individual applications and contributing to the implementation of specific projects. While in some circumstances it will be necessary to refuse planning permission on natural heritage grounds, authorities should always consider whether environmental concerns could be adequately addressed by modifying the development proposal or attaching appropriate planning conditions. In negotiating over development proposals, authorities should first seek to avoid any adverse effects on the natural heritage. Where this is not possible and other material considerations clearly outweigh any potential damage to the natural heritage, they should endeavour to minimise and mitigate the adverse effects and consider the scope for compensating measures. They should always encourage the retention and enhancement of features of natural heritage

Mitigation Legislation / Guidance Extracts
interest and seek to avoid the fragmentation or isolation of habitats. Where appropriate, they should also consider the scope for concluding an access agreement."
Scottish Transport Appraisal Guidance (STAG): http://www.scotland.gov.uk/library5/transport/stag-07.asp **Environment Section – Paragraph 6.15.2:** "6.15.2 The overall objective should be to maintain biodiversity in the study area, including wildlife habitats and species and to improve the status of rare and vulnerable species wherever possible. Transport proposals should therefore be designed: To avoid harmful development affecting protected habitats. All EU member countries have such areas and networks, for example, those established under the Birds Directive (79/409/EEC) and the Habitats Directive (92/43/EEC) — the Natura 2000 sites, National Nature Reserves, Sites of Special Scientific Interest and regionally and locally designated sites; to avoid development in, or close to, unprotected but valuable and sensitive habitats (e.g. important bird areas); to avoid fragmentation of wildlife migration routes, e.g. by avoiding migration zones, or by mitigating the barrier effect by providing a tunnel or 'ecoduct' for wildlife; and to adopt the "no net effect" principle, providing full compensation for lost biodiversity values where loss is unavoidable. "
WebTAG – Biodiversity Sub-objective: http://www.webtag.org.uk/webdocuments/3_Expert/3_Environment_Objective/3.3.10.htm "1.2.18 Mitigation Where scheme options include proposals for mitigation, this should generally be taken account of in the appraisal of impacts. However, an exception to this general rule is described below. There are three categories to consider: • design proposals to minimise the impact of the proposal on the site (reducing runoff, for example); • on-site, or near-site, mitigation to help conserve existing biodiversity interest where the impacts can not be minimised (e.g. dedicated animal crossings, land management regimes); and • off-site proposals (such as habitat replacement) to compensate for biodiversity and earth heritage losses. These categories should be developed sequentially in scheme design. 1.2.19 The first two categories are essentially about minimising the effects on or near the site. It is appropriate for these to be considered in appraising impact, provided they have been documented properly in the Environmental Statement. The key is to make an appropriate judgement about net impact. Where there is some risk in the mitigation proposals, it is appropriate to complete separate appraisals, for the 'with' and 'without' mitigation cases. 1.2.20 The third category above is about compensation for expected loss, though in Environmental Statements it is often described as 'mitigation'. A precautionary approach needs to be taken here: often it is not appropriate to lower the impact category on the basis of off-site compensation proposals, as these are unlikely to fully recompense for the lost features. This is especially so for the more valuable sites.

10.5.9 The following section outlines proposed mitigation, which has been developed in close liaison with appropriate statutory advisory organisations i.e. SNH, SEPA etc. It should be noted that although mitigation for roe deer is briefly mentioned in this chapter, this is specifically an animal welfare and road safety issue.

10.5.10 Elements of the mitigation strategy such as habitat creation, fencing and underpasses are strategically designed to provide mitigation for numerous receptors simultaneously. For example, badgers and otters will use the same underpasses, and bats will utilise underpasses, culverts and overbridges if designed and managed through careful control of lighting and planting.

Specific Mitigation

10.5.11 Mitigation is described below and selected specific habitat creation is listed in Table 10.15 for habitats and species. Information on Bird and Bat Boxes is presented in the relevant Appendices (A10.3 and 10.4). More detailed mitigation for habitats and species, including location requirements and residual impacts is provided in Appendix A10.17.

10.5.12 Mitigation includes areas where it is assumed land will be aquired through landowner agreement, as well as areas proposed to be bought through Compulsory Purchase Order (CPO). In some cases, the application of mitigation may still not reduce impacts to below Moderate significance. Where possible, it is proposed to seek to reduce these impacts through the provision of offset mitigation. Offset mitigation is in the process of being developed in consultation and agreement

with the regulatory authorities and, thus, in general, location details are unable to be provided at the time of writing this report (refer to Part E of the ES).

Terrestrial Habitats

10.5.13 Mitigation of ecological impacts on semi-natural habitats has been incorporated into all stages of the EIA process, via ecological inputs to route selection and construction methods. Such measures have reduced or avoided impacts associated with important ecological habitats and designated sites.

10.5.14 However, the proposed scheme will result in habitat loss, fragmentation, severance and pollution impacts. Details of some of the major constraints imposed on habitats due to the proposed scheme are summarised in Section 10.4 (Potential Impacts), with more extensive discussion provided in Table 5, Appendix A10.1. These impacts will be minimised via measures aimed at reducing the significance of these impacts to Minor/Negligible levels, such as best practice construction measures, translocation of vegetation where practical, restricting work to the route corridor and minimising the size of site compounds.

10.5.15 Where the proposed scheme results in significant ecological impacts that cannot be sufficiently mitigated by generic measures, such as loss of woodland, wetland and other ecologically important habitats, habitat creation will be implemented to offset these impacts.

10.5.16 Within addition to general ecological mitigation strategies across the full scheme, habitat creation will also be aimed at contributing directly to biodiversity targets identified in local (LBAP) and national (UK BAP) strategies. For example, wych elm (LBAP species) will be widely incorporated into roadside planting schemes, wet and riparian woodland (UK and LBAP habitats, respectively) will be created along watercourses and localised woodland planting will be designed to improve landscape connectivity for red squirrels (UK and LBAP species).

10.5.17 Planting for habitat creation will be designed to blend with the existing semi-natural habitats, and native species characteristic of the area will be used. For example, native trees and shrubs will be planted along the banks of burns, where appropriate, to recreate the original riparian vegetation characteristics and to allow a suitable pattern of light and shade along the watercourse.

10.5.18 Landscaping will also be biodiversity-lead, e.g. new grasslands will be aimed at replicating locally found National Vegetation Classification (NVC) communities and woodland planting will follow Rodwell and Patterson (1994) Creating New Native Woodlands guidelines. Consideration will be made for allowing areas to revegetate naturally.

10.5.19 An Environmental Management Plan will be produced for the areas purchased for habitat creation and the soft landscaping. This management plan will be developed in accordance with guidance from the Scottish Executive Trunk Road BAP and SNH.

10.5.20 Specific habitat creation is detailed within Appendix A10.1, and on Figures 11.5a-p.

Badger

10.5.21 Badger underpasses and badger-proof fencing represent the main mitigation techniques and the location of which are listed in the confidential badger report supplied to SNH and Scottish Executive. A number of other mitigation measures are to be implemented that include:

- direct mortality and loss of setts will be prevented by sett exclusion. Where necessary, replacement setts will be created according to SNH guidelines at least 9 months prior to destruction of existing setts. In addition, replacement setts must show evidence of being known to badgers of the affected social group prior to exclusion. Detailed methodologies for sett exclusion and replacement sett design will be contained in a badger exclusion method statement, which will be produced for each affected sett. The badger method statement will;
- identify where specific impacts upon badger setts, including loss or disturbance, will occur;

- include the results of further badger surveys;
- describe the status of each sett, taking in to account data recorded during the 2004/2005 surveys and subsequent follow up surveys including sett watching to inform the size of social groups present where appropriate;
- describe in further detail propsed mitigation measures including the location and design of replacement setts where appropriate;
- include details of how the sett exclusion will take place; and
- include details of a monitoring program to ensure that the badger exclusion has been successfully achieved.

10.5.22 A licence can be granted to permit certain actions, which would otherwise be in contravention of the law. For example, disturbance and destruction of a badger sett. The advice of SNH will be sought prior to any such activities and their advice followed. Initially, this advice will be sought in the form of the development of 'ghost licences', which will mirror the contents of the full licence. This approach will enable the development of a method and the full information required to ensure SNH are comfortable that the approach will fulfil the conservation regulations and maintain the favourable conservation status of the species concerned.

Bats

10.5.23 The approach to bat mitigation includes the following key elements:

- direct mortality will be prevented by exclusion of roosts that are to be destroyed. A licence must be obtained from the Scottish Executive Environment and Rural Affairs Department (SEERAD) in advance of habitat clearance/disturbance commencing. It is not necessary to demonstrate that bats are using replacement roosts prior to destruction, but replacement roosts must be provided prior to works;
- construction activities including the felling of trees and destruction of buildings will be timed to avoid periods when bats are sensitive to disturbance in agreement with SNH. Such features will be rigorously inspected immediately prior to their removal by licensed ecologists and a precautionary approach will be adopted to prevent any bat mortalities e.g. sectional felling of trees in autumn;
- the use of screens to protect bats that may be roosting in trees during construction;
- a 30m buffer will be marked out around all bat roosts (that are not to be excluded and destroyed), no construction activities that constitute 'disturbance' to bats will take place within this buffer zone;
- works must follow BS 5837 (1991) guidance for trees in relation to construction, to avoid damage to the tree. Trees to be retained must be safeguarded from damage according to BS 5837;
- culverts and underpasses have been shown to be used by bats (Bach and Limpens, 2004) if at least 1.5m x 1.5m in cross section (Brinkmann et al., 2003). These structures are included as mitigation for badgers and otters and will be designed and managed to allow water to flow through and include lead-in structures or planting in order to increase chance bat use and thus reduce fragmentation;
- bat boxes will be erected on buildings, where appropriate, and in agreement with the landowner Similarly, woodland areas lost as part of the scheme will be replaced at nearby suitable locations and existing areas of habitat enhanced;
- linear habitat planting alongside the scheme will be incorporated along bat flyways and within 30m of bat roosts to direct bats over the scheme and therefore prevent direct road mortality from occurring;
- night-time working will not be permitted without agreement from SNH and carriageway lighting will be reduced, eliminated or designed to be sympathetic to bats;

- the use of Sustainable Urban Drainage Systems (SUDS) to manage pollution incidents; and
- areas of riparian woodland will be created alongside burns to offset habitat loss and minimise disturbance through noise reduction. These woodlands will include species of local importance such as wych elm and aspen as well as willow, birch and alder.

10.5.24 A licence can be granted under Section 44 of the Conservation Regulations 1994 that will permit certain actions, which would otherwise be against the law, to be carried out under certain circumstances and where an action is deemed necessary; including where approved development is taking place. Such actions include the killing, injury or taking of bats, or the destruction, damage or obstruction of access to any place used by bats for shelter, protection or breeding including within a dwelling house. The licensing system is provided by SEERAD but the advice of SNH will be sought prior to any such damage and their advice followed.

10.5.25 Three tests must be granted before a licence may be granted and if any of these tests fail the licence application will be unsuccessful. It must be demonstrated that:

- the reasons for the works must be clearly stated;
- there is no satisfactory alternative to granting a licence; and
- the action proposed will not be detrimental to populations of the species concerned at a favourable conservation status in their natural range.

10.5.26 The conservation status will be taken as 'favourable' when the following criteria are met:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long term basis as a viable component of its natural habitats;
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its population on a long-term basis.

10.5.27 In relation to the requirements as much information as possible will be provided including the following:

- information on the numbers of numbers of animals, habitat type and locations to be affected including details and results of surveys;
- details of the action to be taken and the methodology that will be taken; and
- details of discussions with SNH and any other relevant information.

Breeding and Wintering Birds

10.5.28 The approach to breeding and wintering bird mitigation includes the following key elements:

- construction activities including the felling of trees and clearing of scrub will be timed to avoid periods when birds are nesting i.e. March-July inclusive, thus preventing disturbance to breeding birds. Areas may be pre-felled or cleared in winter to make habitat undesirable for nesting;
- construction activities in the vicinity of key winter bird habitats will be timed to avoid October to March to prevent disturbance to wintering birds;
- areas of habitat will be created to offset habitat loss although these areas will be situated away from the scheme to prevent RTAs, this will include the provision of a grassland buffer either side of the road before any scrub or woodland planting therefore allowing a clear sightline of the traffic;

- planting of dense native tree and scrub species (taking into account direct mortality impacts) to screen noise and vibration disturbance associated with operation of the proposed scheme from birds located within adjacent habitats; and
- sympathetic planting of second (and subsequent) stage attenuation ponds to allow use by wintering birds.

Otter

10.5.29 Mitigation for otters is aimed at maintaining populations, especially breeding populations, minimising disturbance and maintaining access for otters to their present habitats, to allow existing otter populations to expand and colonise new areas, and minimising the risk of RTAs involving otters as follows:

- prevention of direct mortality through the exclusion of holts that are to be destroyed and the provision of artificial holt sites and habitat creation will be necessary. Exclusions will be carried out following prescribed measures and in consultation with SNH. The destruction or disturbance of an otter holt/couch requires a special derogation under the European Habitats Directive. A licence to undertake such works will therefore need to be obtained from SEERAD, which will include a method statement. Advice will be sought from SNH in the form of the development of 'ghost licences', which will mirror the contents of the full licence. This approach will enable the development of a method and the full information required to ensure SNH are comfortable that the approach will fulfil the conservation regulations and maintain the favourable conservation status of the species concerned.
- obtaining the licence at least 10 months prior to development commencing, and a method statement prepared. Detailed methodologies for holt exclusions and artificial holt design will be outlined in this method statement;
- demarcation of areas where otter activity is recorded within 50m of any construction activities during the construction period;
- restricting construction activities within 50m of otter lying-up sites or watercourses to reduce disturbance;
- the incorporation of bridges or culverts (with mammal ledges) on every watercourse crossing to reduce risk of RTAs and reduce habitat fragmentation;
- the erection of otter-proof fencing wherever the scheme comes within 150m of a watercourse or a known otter commuting route to reduce risk of RTAs;
- areas will be marked off to prevent disturbance to the riparian zone (up to 5m from top bank) during the construction period;
- the creation of artificial otter holts where appropriate, management of existing riparian habitat through fencing-off sections of riverbank (to encourage scrub growth), and the provision of ponds, ox-bows and new stream alignments to offset habitat loss and improve carrying capacity;
- night-time working will not be permitted unless agreed by SNH and carriageway lighting will be reduced or eliminated;
- the use of Sustainable Urban Drainage Systems (SUDS) to manage pollution incidents; and
- areas of riparian woodland will be created along side burns to offset habitat loss and minimise disturbance through noise reduction. These woodlands will include species of local importance such as wych elm and aspen as well as willow, birch and alder.

10.5.30 The method statement will also identify:

- where specific impacts upon otters and their habitat will occur;
- the results of further otter surveys including the status of lying-up sites and evidence of breeding:

- mitigation measures including detailed methodologies for holt exclusions and artificial holt design; and
- details of a monitoring programme to ensure that the favourable conservation status of the otter population has not been compromised.

Red Squirrel

10.5.31 The approach to red squirrel mitigation includes the following key elements:

- all tree clearance works are to be undertaken outwith the red squirrel breeding season where practicable in areas of red squirrel activity. Such activities must be undertaken from September to November to minimise stress to red squirrels during the sensitive period. A strategy to ensure adequate protection of red squirrels and their habitats is being developed in liason with SNH;
- pre-construction surveys to confirm presence/absence of active dreys;
- should any active drey be present in the vicinity of the proposed carriageway or other area of proposed works, no action will be taken without prior agreement with SNH;
- new 'core' areas of woodland will be created for red squirrels to offset the loss of existing habitat. Existing woodland will be managed specifically for red squirrels through removing species favourable to grey squirrels such as beech and hazel and planting trees of different age and species composition e.g. Scots pine, European larch, Norway spruce, birch, ash and alder. This mitigation strategy will also help to prevent red squirrel populations from becoming isolated, as it will connect woodland areas that are currently fragmented through providing commuting corridors; and
- additional mitigation is likely to include the introduction of a new scheme in partnership with the FC to manage grey squirrel numbers. This is likely to involve a regime of humane control in pre-identified target areas and will aim to prevent grey squirrels from becoming established in the study area and beyond.

Water Vole

10.5.32 Mitigation for these mammals is aimed at maintaining populations, especially breeding populations, minimising disturbance and maintaining access to their present habitats to allow existing populations to expand and colonise new areas by:

- demarcation of areas where water vole activity is recorded within 50m of any construction activities during the construction period;
- restricting construction activities within 30m of water vole burrow sites or watercourses to reduce disturbance;
- the incorporation of bridges and box culverts (with mammal ledges) on every watercourse crossing to reduce risk of RTAs and reduce habitat fragmentation;
- demarcation of areas to prevent disturbance to the riparian zone (to 3m from the bank) during the construction period;
- enhancement of existing riparian habitat through fencing-off sections of riverbank (to encourage scrub growth), and the provision of ponds, ox-bows and new stream alignments to offset habitat loss; and
- the use of SUDS to manage pollution incidents.

Amphibians

10.5.33 The approach to amphibian mitigation includes the following key elements:

- no specific habitat will be created for amphibians as the predicted impacts were of Minor significance. However, habitat creation proposed as mitigation for other receptors (such as creation of wetland habitat for otters) will also be of benefit to amphibians. To reduce the

numbers of amphibians killed during construction of the scheme, destructive searching of terrestrial habitats will be undertaken prior to site clearance and any amphibians found will be relocated to suitable areas;

- where ponds will be destroyed, best practise measures will be implemented to ensure that no or very few amphibians remain. This may involve netting, bottle trapping and draining down. Draining down by pumping or syphoning water out of a pond must only be done through a screen (1mm gap geotextile or similar) in order to prevent death or injury to newts and other pond life, and also allow amphibians present to relocate; and
- underpasses provided for badgers and otters will be suitable for amphibian use thus reducing habitat fragmentation.

Brown Hare

10.5.34 Specific mitigation prescribed for other species such as badgers and birds including habitat creation will also mitigate for the effects of the road scheme on brown hare populations. These are as follows:

- the provision of overpasses, underpasses and fencing as prescribed under mitigation for larger mammals such as badgers (Appendix A10.2) and otters (Appendix A10.6) to reduce the number of RTAs and reduce fragmentation; and
- compensatory habitat to offset impacts associated with habitat loss will provide suitable habitats for brown hare, including creation of grassland, scrub and woodland habitats as prescribed under mitigation for other species such as birds (Appendix A10.4) and red squirrels (Appendix A10.7).

Reptiles

10.5.35 The approach to reptile mitigation includes the following key elements:

- no specific mitigation will be created for reptiles as no impacts of greater than Minor significance were predicted. However, secondary benefits will be achieved through landscaping by the creation of small plots of habitat suitable for habitation by reptiles on south facing road embankments;
- areas that have been identified as being of high to moderate value to reptiles and are to be lost or severed by the road will be made unsuitable for reptile habitation prior to site clearance. Artificial refugia will be removed by hand, vegetation will be strimmed outwith the hibernation and breeding season (November to February, and July and August, respectively); and
- scrub may be removed during the hibernation season and from March to June.

Terrestrial Invertebrates

10.5.36 No specific mitigation is necessary for terrestrial invertebrates, although mitigation prescribed for other species such as badgers and birds will help mitigate for the effects of the road scheme on terrestrial invertebrate populations. These are as follows:

- fencing of areas adjacent to construction sites to prevent additional mortality and habitat loss on adjacent un-impacted land; and
- compensatory habitat will be supplied by mitigation for terrestrial habitat loss (Appendix A10.1) and landscape (Chapter 11) and Visual (Chapter 12).

Water Shrew

10.5.37 No specific mitigation is proposed for water shrew, although mitigation prescribed for other species/habitats such as otter, amphibians and freshwater habitat will contribute to mitigating the effects of the scheme on water shrew populations. These include:

- the incorporation of bridges and box culverts (with mammal ledges) on every watercourse crossing to reduce habitat fragmentation;
- marking off areas to prevent disturbance to the riparian zone (to 5m from bank) during the construction period;
- enhancement of existing riparian habitat through fencing-off sections of riverbank (to encourage scrub growth), and the provision of ponds, ox-bows and new stream alignments to offset habitat loss;
- the use of Sustainable Urban Drainage Systems (SUDS) to manage pollution incidents; and
- creation of areas of riparian woodland along side burns to offset habitat loss and minimise disturbance through noise reduction.

Fish

10.5.38 The approach to fish mitigation includes the following key elements:

- any activities that require works within watercourses and/or their de-watering or realignment will be avoided where possible, if unavoidable they will be carried out between April and September to reduce disturbance to salmonids;
- fish will be removed from sections of waterways to be de-watered, re-aligned or excavated, using electric fishing, and translocated to an appropriate alternative site;
- disturbance to salmonids through noise and vibration will be reduced through avoiding the first third of the egg incubation period (mid October - end December). A 'soft start' approach will be adopted in the event of any piling while suspended solid works will be carried out between May and September;
- night working will be avoided, allowing a quiet period for migratory fish to pass the construction site. Lights on the construction sites will be directed away from the water;
- high span bridges with set-back piers will be constructed over the River Don to prevent damage to salmonid habitat and prevent disturbance to these important fisheries; and
- use of SEPA PPGs and SUDS as detailed in generic and otter mitigation will prevent/manage pollution incidents during construction and operation.

Freshwater Habitat

10.5.39 The approach to aquatic habitat mitigation includes the following key elements:

- road drainage treatment to ensure adherence to strict water quality standards (see Chapter 9: Water Environment);
- realignments to include meander bends, habitat enhancement and retention of similar river lengths where feasible;
- use of depressed invert box culverts that allow the retention of natural substrate and maintenance of similar geomorphological regime; and
- minimisation of culvert length and use of bridges for valuable Habitat Areas to avoid habitat fragmentation and potential barriers for migratory species.

Table 10.15 - Selected Specific Mitigation for Habitats and Species

Impact (Moderate or greater significance)	Ecological Receptors	Site-specific Mitigation
Section NL1		
Direct Mortality due to RTAs during operation of the road	Badgers, Otters	• Fencing to be installed on chainage sections ch3147800- 315080 and ch315620-316180. In addition, side roads to be fenced from ch315000 to 300m west of AWPR, eastern arm fenced for 300m to roundabout. • Otter-proof fencing to be installed at ch315080-315620 will prevent RTAs (see Figure 11.5a). • Installation of depressed invert culvert with integral mammal ledge at crossing of Kepplehill Burn at ch315200 will help prevent drowning and reduce fragmentation (this underpass is over 100m in length and may only be occasionally used).
Habitat Loss	Badgers, Terrestrial habitats, Bats, Birds	• Habitat loss compensated for by planting of 0.78ha scrub south of North Kingswells Junction, west and east of the proposed road. (HA N11). Ch 314900.00 (Figures 11.5a-b)
Disturbance and Fragmentation	Bats, Badgers, Otters	• Overbridges designed and managed sympathetically for mammal usage at: North Kingswells Junction (ch314970); Kepplestone Overbridge (ch315620); and Ashton Overbridge (ch316020). • Installation of depressed suitably designed culverts with integral mammal ledge at Kepplehill Burn (ch315200) and Gough Burn (ch316390). • These measures will reduce construction and operational disturbance and fragmentation.
Section NL2		
Habitat Loss of valuable pond and stream habitats	Terrestrial Habitats, Badgers, Otters	• Habitat loss will be offset by habitat creation in several locations in this section of the route. These include: • three blocks of coniferous woodland to the west of the road in HAs N25 and N28 at ch316450–316800 that extend the habitat of Craibstone Wood North (Figure 11.5c). • mixed woodland to the west of the road that extend the habitat of Craibstone Wood North in HA N25 at ch316800-316900 (Figure 11.5c). • At the Ashtown overbridge, block of mixed woodland to the west of the road (E) in N15 at ch316800-316920 (Figure 11.5b). • Coniferous plantation in two blocks to the west of the road either side of the A96 junction in HA N28 at ch317000–317150 that further extend the habitat of Craibstone Wood North (Figure 11.5c). • Block of coniferous plantation to east of the road and south of A96 that extends the habitat of Craibstone Wood. HA N28 at ch317000-317050 (Figure 11.5c). • Narrow linear corridor of mixed plantation to the east of the road and surrounding the attenuation ponds (1.17ha) from ch317100 – 317310 (Figure 11.5c). • There are two ecological ponds to be created within HAs N28 and N30.
Direct Mortality due to RTAs	Badgers, Otters	• Otter-proof fencing to be installed at ch316180-317500 and along a 300m stretch of the A96 west of the A96 Junction, a 600m stretch E of the Junction. A 500m stretch north of the A96 roundabout, a 400m stretch east of the A96 roundabout, and a 1000m stretch west of the A96 roundabout (see Figures 11.5b-e). Fencing provided for otters will also serve as mitigation for badgers.
Disturbance and Fragmentation of Social Group NC during construction and operation	Badgers, Otters, Bats	• Installation of depressed invert culverts with integral mammal ledge at Gough Burn ch316390 and ch316430, Craibstone Burn ch316990, Green Burn ch317330 and A96 culvert and culvert north of A96 roundabout to prevent drowning and reduce fragmentation of territory (see Appendix A10.6).
Section NL3		
Habitat Loss of farmland and 13-14 dry stone walls	Terrestrial Habitats, Otters, Birds, Bats, Badgers	• Dry stone walls proposed along the boundary of the road corridor for landscape mitigation will offset the loss of linear habitat features. • Habitat creation of a block of mixed woodland in HA N33 starting at ch318900 will increase the habitat area of Kirkhill Forest (South and Standingstones Wood, Figure 11.5e), offsets habitat loss and fragmentation and reduce disturbance to Kirkhill Forest. • Mixed woodland strip to the west of the road in HA N54 at ch319150 to ch319430 will minimise disturbance to the habitat of Standingstones Wood (Figure 11.5f). • Block of mixed woodland on the west of the road in HA N41 and at ch320400 will extend the habitat of East Woodlands (Figure 11.5g).

Impact (Moderate or greater significance)	Ecological Receptors	Site-specific Mitigation
		• Coniferous woodland to the west of the road in HA N54 at ch319430 to ch319730 will extend the habitat of Standingstones Wood (Figure 11.5f), offset habitat loss and fragmentation and reduce disturbance to Kirkhill Forest. • Several blocks of mixed and coniferous woodland, which are also required for landscape mitigation (see Chapter 11) associated with the realignment of Bogenjoss Burn from approximately ch319950 to ch321000 offset habitat loss in Kirkhill Forest and East Woodlands, reduce habitat fragmentation and severance of woodland, and create important riparian habitats along the realigned section of the Bogenjoss Burn. • Localised scrub patches to be planted in HAs N41 and N42 between ch320450-320950 (Figure 11.5g).
		• Coniferous woodland to the north of the road in HA N46 and N47 at ch321400 to ch321500 will extend the habitat of the eastern leg of East Woodlands (Figure 11.5h). • Three blocks of mixed woodland 3.92 ha on the north of the road in HA N47 & N50 and at ch321630-ch322130 will replace the habitat lost from Monument Wood (Figure 11.5h) and improve habitat connectivity along the north of the road.
Habitat Loss	Otters, Birds, Bats, Badgers	• Where Bogenjoss Burn is to be re-aligned between ch319950 and ch320500, the new channel will be restored to maximise its ecological value to otters as well as other species such as fish and aquatic invertebrates. • Incorporation of natural bank sides, meanders (where possible) and the planting of emergent vegetation as well as a 10m wide 500m long riparian strip on the west of the re-aligned burn in HA N37 and N41 between ch320000 and ch320500 and a strip of scrub woodland to the east of the burn in HA N37 at ch319970-320400. • This is likely to result in a new riparian zone of greater ecological value than the current burn and result in an impact of minor positive significance.
Fragmentation and potential pollution of riparian habitat Hydrological impacts upon wetland habitat surrounding the area	Otters, Red squirrels, Badgers, Bats	• Kirkhill Wildlife overbridge at ch319960 will be 7.5m width, with splayed wing walls to 'funnel' species over the bridge. The wildlife overbridge will be vegetated across the full width, including scrub woodland. • Green Bridge at ch320180 (Kirkhill Overbridge) will provide a 4.5m carriageway for land access, a 1m access pathway, and a 4.5m vegetated strip for wildlife use • Habitats on both sides of proposed carriageway to be linked via the Kirkhill Wildlife Overbridge and Green Bridge by planting. This will further minimise fragmentation in this area (see Figures 11.5e-h). • Underpasses to be installed at ch317850, ch319250, and ch321320. Bogenjoss Burn culverts with integral mammal ledges (ch320100, ch320215, ch320260, ch320475, ch320500 and ch320870 to reduce fragmentation. • The Kirkhill Overbridge at ch320180 and culverts at chainages noted above will maintain connectivity of commuting corridors for otters in upstream section of burn. • Culvert dimensions at the downstream crossing at ch320870 are likely to result in residual impacts associated with fragmentation and severance of territories and may result in residual impacts associated with the prevention of migration and fish passage and changes to the local distribution of *B. putata*.
Direct Mortality due to RTAs	Badgers, Otters	• Badger-proof fencing to be installed on chainage sections ch317500-ch317670 ,ch318000-318420, ch319160-319800 and ch321280-322020 (see Figures 11.5e-i) and • Otter-proof fencing to be installed at ch317670-ch318000, ch318420-ch319160, ch319800-ch321280 and along a 500m stretch of the U53C Kirkhill road E of South Kirkhill Junction (Figures 11.5e-i). Note: these fences have a combined specification, i.e. suitable for both badgers and otters.
Section NL4		
Habitat loss of riparian and linear habitats	Terrestrial Habitats, Otters, Badgers, Bats	• Habitat loss will be offset by habitat creation in several locations in this section of the route: • At Goval, north of the road, east of the A947 in HA N61 creation of of mixed woodland including a 50m long 10m wide strip of riparian woodland (0.04ha) along the Mill Lade at ch324400 (Figure 11.5j). • At Goval, north of the road, east of A947 in N61 at ch324530-324650 creation of 0.5ha of land set aside for otter habitat between Goval Mill Lade and Goval Burn (Figure 11.5j). • At Goval, south of the road east of the A947 in HA N61 at ch324400 0.66ha of mixed woodland including a strip of riparian woodland 150m long 10m wide north of Goval Burn 0.22ha (Figure 11.5j). • South of Goval Burn east of the A947 in HA N61 at ch324400. Small triangle of mixed woodland 0.17ha (Figure 11.5j). • Secondary mitigation is provided by landscaping in the form of mosaics of scrub and mixed woodland in flood plain field fragments adjacent to Goval Burn, N61, N68 and N69 (Figure 11.5j) (providing mitigation for otter and badger), will offset habitat lost and offset severance and fragmentation impacts. • A replacement pond will be created at Corsehill

Impact (Moderate or greater significance)	Ecological Receptors	Site-specific Mitigation
Habitat Loss	Otters	• Two replacement pipe and chamber holts to be positioned within the existing riparian zone of Goval Burn in N16 at ch324100 and N17 at ch324620.
Direct Mortality due to RTAs	Badgers, Otters	• Fencing to be installed along ch321260-322820, ch322820-323020 and ch323390-325220 including the abutments of the River Dee Crossing. At the B977 overbridge ch323600, the fenced section to extend to approx. 450m north of bridge and to 350m south of bridge. Roundabout at ch324100 fenced 200m west and 400m northeast. Re-aligned A947 at ch324400 fenced for 600m north of AWPR and 450m south. At ch324850 Goval junction fenced, east arm for 300m and west arm for 300m (Figure 11.5i-k)
Disturbance and Fragmentation	Badgers, Otters, Bats	• Installation of a high span bridge over the River Don at ch323050-323370 (see Figure 11.5i-k) will reduce Fragmentation. The bridge is to span the river and floodplain with no in-water piers, therefore there will be no barriers and no change in velocity or scouring is predicted. Likely that bats will fly underthe bridge during operation, avoiding severance of commuting/foraging routes. • Bridges at ch323620 and ch324610 and ch324400 at Goval Burn, Parkhill Aqueduct at ch323950, Goval Burn Underbridge at ch324230 and bridge at ch324400 on Goval Mill Lade, will reduce Fragmentation shown on Figures 11.5i-k (locations shown in Table 9, Appendix A10.6). • Depressed invert box culverts with integral mammal ledges ch325085 on Corsehill Burn (locations shown in Table 9, Appendix A10.6). • Dry mammal culvert to be installed at A947 ch324230 (location shown in Table 9, Appendix A10.6).
Section NL5		
Direct habitat loss, severance and fragmentation of woodland habitats to N and S of route. Potential Pollution and disturbance to woodland habitats	Terrestrial Habitats Badgers Otters, Birds	• Habitat loss, severance and fragmentation to be mitigated by creation of woodland south of the route, mixed woodland is required for landscape and ecological mitigation. Mixed woodland south of the road in HA N72 at ch325700 solely for ecological mitigation will be planted in felled areas extending Littlejohn's Wood (Figure 11.5k). These blocks of woodland will offset habitat loss and reduce fragmentation and disturbance during the long-term operation of the road. • Creation of scrub woodland on north side of AWPR in HA N87 between ch328040 and 328300 (Figure 11.5m) in isolated field fragments to offset habitat loss and fragmentation. • Riparian woodland to be created along Blackdog Burn on either side of the AWPR South of AWPR and east of Blackdog Burn. 0.37ha in HA N91 at ch330000 (Figure 11.5n). • Scrub and riparian mosaic north of road and either side of Blackdog Burn 0.17ha in HA N91 ch329900 to ch329950 (Figure 11.5n). • riparian woodland to be planted on both banks of Middlefield Burn to enhance riparian corridor and offset impacts on otter populations.
Direct Mortality due to RTAs	Otters and Badgers	• Badger-proof fencing to be installed from ch325220-326800, ch327710-328160, ch328790 - 329750 and ch330350 – 331000 (Figures 11.5j-p) to reduce mortality from RTAs. Mammal underpasses at the locations provided below will further reduce mortality from RTAs. • Otter-proof fencing to be installed at ch326800-327710, ch328160 – 328790, ch329750-330350, along a 400 m stretch of the A90 N of the A90 Junction, along the edge of the riparian zone on Middlefield Burn and 250m stretch of Blackdog Access Road (see Figures 10.6f-g). Note: these fences have a combined specification, i.e. suitable for both badgers and otters.
Fragmentation of territory	Otters and Badgers	• Underpasses installed at ch326280, Red Moss Burn Culvert ch327500, Blackdog Burn Culvert ch329950. Culvert on Blackdog Burn east of A90, culvert on Blackdog Ditch and 3 culverts on Middlefield Burn at A90 north junction (see Figures 11.5j-p), will reduce fragmentation of territories and allow passage of badgers from one side of the road to the other. • Installation of depressed invert culverts with integral mammal ledges at Red Moss Burn ch327500, Blackdog Burn ch329950, Blackdog Ditch ch330065 and Middlefield Burn, at the A90 and two side roads will prevent drowning and reduce Fragmentation (locations shown in Table 9 Appendix A10.6).

10.6 Residual Impacts

10.6.1 Following the implementation of mitigation measures, the following key residual impacts are likely to result from the proposed scheme. Key residual impacts (of Moderate or greater significance) are presented in Table 10.16. Full details of the residual impacts and mitigation are presented in Appendix A10.17 and in Chapter 20.

Terrestrial Habitats

Section NL1

10.6.2 The potential impacts in Section NL1 on terrestrial habitats are reduced to residual impacts of Negligible significance.

Section NL2

10.6.3 Habitat creation proposed to mitigate habitat loss, disturbance and fragmentation in the Craibstone Burn (N24), Gough Burn and Craibstone Campus (HA N24-N26) areas is likely to result in residual impacts of Minor significance, which are likely to become Negligible in the long term as the areas of woodland mature.

10.6.4 Mitigation stated in Water Environment (Chapter 9) will prevent any significant pollution to the burns in this section.

Section NL3

10.6.5 Habitat creation proposed to mitigate for habitat loss, disturbance and fragmentation in the agricultural land surrounding Howemoss (HA N32 and N33) Kirkhill Forest and Standingstones Wood (N35-N37) is likely to result in residual impacts of Minor significance throughout this section.

10.6.6 Mitigation stated in Water Environment (Chapter 9) for hydrological impacts will prevent any significant pollution to the burns in this section.

Section NL4

10.6.7 The bridging of the River Don and Goval Burn in addition to the areas of habitat creation proposed at Goval Burn (N61) including mixed woodland in the Goval Burn area are predicted to satisfactorily offset habitat loss in these areas. These areas of habitat creation, combined with best practice working methods are likely to reduce disturbance and fragmentation of terrestrial habitats in these areas, resulting in residual impacts of Minor significance.

Section NL5

10.6.8 The proposed mitigation measures are predicted to result in no residual impacts on habitats at Corby and Lily Lochs.

Badgers

Section NL1

10.6.9 Potential impacts are reduced to Minor residual significance due to habitat creation and the provision of crossings. Other impacts such as mortality during construction and operation are considered to be reduced to being of Negligible significance following mitigation.

Section NL2

10.6.10 Fragmentation remains an impact of Moderate residual significance in this area as there are no suitable safe crossings for badgers. Loss of habitat, fragmentation and disturbance is of Minor residual impacts significance. Other impacts such as risk of mortality during construction and operation are considered to be reduced to being of Negligible significance following mitigation.

Section NL3

10.6.11 Fragmentation, disturbance and habitat loss are reduced to impacts of Minor residual significance due to habitat creation and the provision of a wildlife overbridge and a green bridge in this area. Other impacts such as risk of direct mortality during construction and operation are considered to be reduced to being of Negligible residual significance.

Section NL4

10.6.12 Fragmentation remains an impact of Moderate significance in this area as there are no safe crossings for the badgers. Habitat fragmentation and disturbance are reduced to of Minor residual significance due to habitat creation and generic mitigation. Other impacts such as risk of mortality during construction and operation are considered to be reduced to of Negligible residual significance.

Section NL5

10.6.13 Loss of habitat fragmentation and disturbance is of Minor residual impact significance due to habitat creation and the provision of crossings. Other impacts such as risk of mortality during construction and operation are considered to being of Negligible residual significance.

Bats

Section NL1

10.6.14 In this section, overbridges will reduce risk of direct mortality due to RTAs, however residual impacts of Minor significance remain at Newton Farm and Ashtown Road as if some bats choose not to use enhanced overbridges. Fragmentation of potential roost habitats and foraging corridors are also predicted to be of Minor significance due to the length of Kepplehill Burn Culvert and due to disturbance at Newton Farm if bats are roosting during construction. The residual impacts of habitat loss and pollution would be reduced to Negligible significance.

Section NL2

10.6.15 Mitigation proposed for bats is likely to result in similar residual impacts of Minor significance in this section of the route, with habitat creation of coniferous and mixed woodland in areas N25 and N28 partially offsetting habitat loss and fragmentation impacts although the loss of mature broadleaved woodland is likely to leave a residual impact of Minor significance in the short to medium term.

10.6.16 The provision of culverts, bridges and underpasses (Figure 11.5c and Table 10.15) will reduce habitat fragmentation, disturbance and direct mortality due to RTAs leaving residual impact of Minor significance if bats cannot cross due to the length of culverts. There are likely to be residual impacts of Minor significance due to pollution during construction and due to fragmentation along Green Burn which is to be realigned.

Section NL3

10.6.17 Residual impacts of Minor significance are predicted due to disturbance of roosting and foraging bats at Walton and Sunnybrae Farm (N30). In areas of woodland throughout this section residual impacts of Minor significance would remain associated with risk of direct mortality due to RTAs,

disturbance, severance and fragmentation, especially due to the lack of opportunities for bats to cross the road and disruption of activity. Habitat loss is likely to result in a residual impact of Minor significance in the short-medium term during operation along Bogenjoss Burn until newly created habitat matures. The realignment of Bogenjoss Burn is likely to result in residual impacts of Minor significance due to pollution during construction but reduce to Negligible during operation.

Section NL4

10.6.18 The provision of culverts, overbridges and underpasses, overbridges and 'up and over' planting (i.e. designed to direct bats to cross the proposed scheme at a safe height) in this section will reduce and offset the impacts of direct mortality due to RTAs and habitat fragmentation, leaving a residual impact of Minor significance in the short-medium term at Goval Belt (N58) and Parkhill Pumping Station (N61). Habitat creation in the Goval area and generic mitigation will offset the loss of habitat and pollution leaving a residual impact of Negligible significance. The effects of severance are likely to result in residual impacts of Minor significance where the road passes between areas of valuable roosting and foraging habitat.

Section NL5

10.6.19 Habitat loss at Littlejohn's Wood will be offset by woodland creation in N72 (Figure 11.5k). Fragmentation, disturbance, and RTAs will be minimised by provision of culverts, overbridges and underpasses (Table 10.15 and Figures 11.5k-p) reducing all these impacts to of Minor significance where the road passes between areas of valuable roosting and foraging habitat. The impacts of habitat loss are likely to be of Minor significance at Cranbog where mature trees and a roost are to be lost, but creation elsewhere in the route section will reduce this impact to Negligible significance.

Breeding Birds

Section NL1

10.6.20 All potential impacts in this section on breeding birds are reduced to Negligible residual significance.

Section NL2

10.6.21 Residual impacts of Minor significance remain in areas surrounding Craibstone Campus including Craibstone Burn and Pond and Green Burn (N25, N26 and N278). Residual impacts are predicted due to temporary fragmentation and disturbance and risk of due to potential direct mortality from RTAs, fragmentation and disturbance during operation.

Section NL3

10.6.22 Residual impacts of Minor significance remain in areas surrounding Bogenjoss Burn including Howemoss and Kirkhill Forest and surrounding woodlands (N37, N38, N41, N42, N43 and N47). These impacts would result from temporary habitat loss and disturbance during construction and from the risk of direct mortality due to RTAs during operation.

Section NL4

10.6.23 Residual impacts of Minor significance remain at the River Don and Goval Burn and the Mill Lade (N52 and N61) due to temporary habitat loss during construction and and the risk of direct mortality from RTAs, and disturbance during operation.

Section NL5

10.6.24 Residual impacts Minor significance would result from short-term construction disturbance to Corby and Lily Lochs and surrounding agricultural fields (N85 and N87) with potential direct mortality due to RTAs, and fragmentation and disturbance of adjacent habitats during operation.

Wintering Birds

Section NL1

10.6.25 Residual impacts of Minor significance during operation are predicted for wintering birds around the Gough Burn and Kepplestone Burn areas including the surrounding agricultural land and Newhill Woods (HAs N11-N17). Impacts relate to a risk of direct mortality from RTAs, fragmentation and disturbance.

Section NL2

10.6.26 In this section of the route, residual impacts of Minor significance are predicted for wintering birds around the SAC Craibstone Campus, including woodlands and Craibstone Burn and Pond (HAs N23, N25-N26 and N28) due to a risk of direct mortality from RTAs, permanent habitat loss, fragmentation and disturbance during operation. Impacts to Habitat Areas N18-N20 and N24 would be reduced to Negligible.

Section NL3

10.6.27 Residual impacts of Minor significance during operation are predicted for wintering birds around the Bogenjoss area including Howemoss, Kirkhill Forest and surrounds (N30-N35 and N37-N48) due to direct mortality from RTAs, permanent habitat loss, fragmentation and disturbance.

Section NL4

10.6.28 Residual impacts of Minor significance are predicted during construction for wintering birds in the River Don (N52) due to temporary fragmentation and disturbance.

10.6.29 Residual impacts of Minor significance are predicted during operation for wintering birds in agricultural areas surrounding the River Don / Goval Burn and the Formartine and Buchan Way (N49-N52, N54-N55, N58, N60-N64 and N67-N70) due to direct mortality from potential RTAs, permanent habitat loss, fragmentation and disturbance.

Section NL5

10.6.30 Residual impacts of Minor significance are predicted for wintering birds in agricultural areas surrounding Lochgreens Farm / Corby Loch, Backhill of Cranbog and Fifehill (N74, N80-N81, N83, N85-N90, N93-N94 and N96-N97 due to direct mortality from potential RTAs, permanent habitat loss, fragmentation and disturbance.

Otters

Section NL1

10.6.31 Risk of direct mortality is reduced by otter fencing and provision of culverts with integral mammal ledges and underpass to of Negligible significance. Once mitigation has been implemented, disturbance and habitat loss would also be reduced to Negligible residual significnace. Residual impacts of Minor significance are predicted due to habitat fragmentation as some otters may not use the 155m long culvert proposed at Kepplehill Burn due to its length.

Section NL2

10.6.32 Residual impacts are predicted to occur following mitigation for otters using Gough Burn, Craibstone Burn, Green Burn and Craibstone Pond. Habitat creation of coniferous and mixed woodland in areas N25 and N28 will partially offset habitat loss and result in residual impacts of Minor significance in the long term. Generic mitigation will minimise potential pollution and reduce the significance of disturbance to Negligible significance. Fragmentation is likely to result in a Minor residual impact for Gough Burn, however, the extensive realignment of Green Burn and extent of

works at Craibstone mean that residual impacts are of Moderate significance for fragmentation due to reduced value as a commuting corridor. At these watercourses, the length and dimensions of the proposed culverts may discourage use by otters.

Section NL3

10.6.33 Residual impacts on otters are predicted in the Bogenjoss area. Proposed mitigation will minimise potential water pollution, and disturbance which will reduce the significance of these residual impacts to Negligible. However, the culvert dimensions at the downstream crossing of the Bogenjoss Burn are likely to act as a barrier to otter passage and may result in residual impacts of Moderate significance associated with fragmentation and severance of otter territories.

Section NL4

10.6.34 Mitigation in this core area for otters including holt replacement is likely to reduce most potential impacts on otters in the River Don and the Goval area. Predicted residual impacts of Minor significance are associated with holt destruction, habitat loss (of suitable areas for holts) at the River Don, fragmentation, and disturbance of three holts and lying up sites during construction and operation on the Goval Burn and Corsehill Burn.

Section NL5

10.6.35 Fragmentation, disturbance, and RTAs will be reduced to Negligible by provision of underpasses and fences (Figures 11.5k-p). Residual impacts of Minor significance are predicted for otters due to habitat loss at Red Moss Burn and fragmentation at Middlefield Burn.

Red Squirrel

Section NL1

10.6.36 There are no impacts predicted in Section NL1 for red squirrel due to lack of suitable habitat.

Section NL2

10.6.37 The SAC Craibstone Estate maintains a locally important red squirrel population. Habitat creation in several key areas will partially offset the impact of habitat loss, resulting in impacts of Minor significance when these woodlands mature. The area of woodland creation is greater than that being lost, however the residual impact will remain as the loss of mature woodland cannot be replaced in the short term.

10.6.38 The residual risk of direct mortality during clearance for construction is Negligible following mitigation. Howeve, direct mortality during the operation of the road cannot be fully mitigated for, as the road is too wide to create rope bridges or other structures to allow safe passage of squirrels over the road. Fragmentation of the squirrel habitats also cannot be fully mitigated, particularly in the short term, although in the long term, the habitat creation will improve habitat connectivity to the west of the road.

10.6.39 Overall, residual impacts are predicted to be of localised Major significance (i.e. for the red squirrel population in the Craibstone area), and for this reason additional offset mitigation is proposed, as described in Chapter 56 of Part E (Cumulative Impact Assessment).

Section NL3

10.6.40 Habitat creation of coniferous and mixed woodland adjacent to Kirkhill Forest, Standingstones Wood, Bogenjoss Burn and Monument Wood will partially offset habitat loss and disturbance. However, predicted residual impacts of Moderate significance would remain on these nationally important sites (Figures 11.5e-h). The provision of wildlife overbridge and green bridge will reduce potential fragmentation and direct mortality due to RTAs during operation to Moderate residual

significance. However, there is no similar mitigation for fragmentation of East Woodlands and impacts are considered of Major residual significance. At Monument Wood, areas of woodland have subsequently been felled therefore residual impacts of fragmentation and the risk of direct mortality during clearance for construction are of Negligible significance.

Section NL4

10.6.41 Residual impacts on the Goval Belt are of Minor significance due to habitat loss, disturbance, and fragmentation as there is already an existing road. Residual risk of direct mortality during clearance for construction is of Negligible significance.

Section NL5

10.6.42 Post survey, much of Corsehill and Littlejohn's Woods were felled. Proposed replanting will reduce habitat loss and disturbance during both construction and operation to residual impacts of Minor significance in the long-term. However, fragmentation is a residual impact of Moderate signficanance.

Fish

Section NL1

10.6.43 There are no residual impacts on fish predicted in Section NL1.

Section NL2

10.6.44 Residual impacts on fish in Gough, Craibstone and Green Burns are of Minor significance due to risk of stranding during culvert construction. Due to the realignment of Green Burn, there remains a risk of Minor significance due to pollution during construction. All other residual impacts on fish are of Negligible residual significance.

Section NL3

10.6.45 Residual impacts of Minor significance are predicted upstream at Bogenjoss Burn, associated with the risk of direct mortality due to pollution during extensive culvert construction and realignment, the risk of stranding of fish and the potential prevention of migration and fish passage resulting from the long culvert length at the downstream crossing of the Bogenjoss Burn.

10.6.46 Downstream at Bogenjoss Burn this potential barrier to fish movements and subsequent habitat loss is predicted to result in a residual impact of Moderate significance.

Section NL4

10.6.47 On the River Don and Goval Burn, residual impacts on fish are predicted to be of Negligible significance due to reduced mitigation during construction, and the avoidance and reduction of disturbance during bridge construction.

Section NL5

10.6.48 There are only Minor residual impacts remaining on fish predicted in Section NL5, with potential impacts due to the risk of stranding during construction on Red Moss, Blackdog.

Freshwater Habitats

Section NL1

10.6.49 Potential impacts are not fully mitigated by the proposed mitigation measures on Kepplehill Burn, which therefore remain as Minor significance due to the effect of culverting reducing in stream habitat complexity.

Section NL2

10.6.50 At Gough, Craibstone and Green Burns the provision of depressed invert box culverts will reduce the loss of in-stream habitat complexity, although the use of culverts would result in a residual loss of bankside and riparian habitat and localised changes in the distribution of freshwater invertebrates. The residual impacts are of Minor significance due to the culvert dimensions and extent of burn realignment required.

Section NL3

10.6.51 Residual impacts of Moderate significance are predicted at the downstream crossing Bogenjoss Burn, where the culvert dimensions will lead to residual impacts associated with bank and riparian habitat loss, fragmentation of burn habitats and changes to the local distribution of freshwater invertebrates. Residual impacts of Minor significance are predicted in other areas of Bogenjoss Burn, where mitigation is proposed for realignment and culverting of the burn.

Section NL4

10.6.52 On the Goval Burn, residual impacts on freshwater habitats are predicted to be of Minor significance due to reduced risk of pollution and sedimentation during construction and operation. On the River Don given that the bridge will involve no in-water works and that pollution prevention measures are in place, the residual impacts are Negligible.

Section NL 5

10.6.53 There are residual impacts of Minor significance on freshwater habitats (Red Moss, Corsehill and Blackdog Burn).

Brown Hare

10.6.54 The only residual impacts in the Northern Leg for brown hare are predicted in section NL3 at the agricultural land surrounding Howemoss where residual impacts are predicted to be of Minor significance.

Terrestrial Invertebrates

10.6.55 The only residual impacts in the Northern Leg for terrestrial invertebrates are predicted in section NL5 at Corby Loch following the generic mitigation for terrestrial habitats and otter this residual impact will be reduced to Negligible significance.

Table 10.16 - Summary of Proposed Site-specific Mitigation and Key Residual Impacts of At Least Moderate Significance

Ecological Receptor	Habitat Area	Impact	Impact Significance	Site-specific Mitigation	Residual Impact Significance
Section NL1					
There are no residual impacts of greater than Minor significance for any receptor in this section					
Section NL2					
Badger	Craibstone SAC	Fragmentation of territories and loss of foraging and setting habitat	Moderate	Underpasses as detailed in badger mitigation and A10.17	Moderate
Otter	Craibstone Burn Green Burn	Fragmentation due to culverting (and realignment of Green Burn) during construction and operation	Major	Underpasses detailed in badger mitigation can also be used by otters, and will minimise fragmentation. Culverts at locations on watercourses as detailed above will aim to reduce fragmentation. However, culvert dimensions for Craibstone and Green Burn are likely to result in residual fragmentation.	Moderate
Red Squirrel	Craibstone Wood South N24 (woodland 2) Craibstone Wood North N25 (woodland 3)	Direct mortality due to RTAs during operation	Major	There is no specific mitigation practical for red squirrel during operation of the scheme. Squirrels are unlikely to use underpasses designed for other mammals and this impact therefore cannot be mitigated for.	Major
		Fragmentation of habitat may result in isolation of these populations and ultimately extinction in these areas	Major	There is no specific provision to provide mitigation for squirrels in this area, as they are unlikely to use mammal underpasses and therefore are not mitigated for.	Major
Section NL3					
Otter	Bogenjoss Burn N38, N42 and N45	Fragmentation due to crossing and realignment of riparian habitat and wildlife corridors,	Major	The Kirkhill Wildlife Overbridge at ch319960 and culverts at chainages noted above will maintain connectivity of commuting corridors for otters in upstream section of burn. Culvert dimensions at ch320870 are likely to result in residual impacts associated with fragmentation and severance of otter territories.	Moderate
Red Squirrel	Kirkhill Forest North N37 (woodland 5)	Fragmentation and risk of direct mortality due to RTAs during operation	Major	The above overbridges will be of use to red squirrrl in this area an thus partially mitigate these impacts	Moderate
	Kirkhill Forest North N37 (woodland 5) Standingstones Wood N35 (woodland 12) East Woodlands N43 (woodland 6)	Habitat loss and disturbance	Major	Habitat creation in this area will partially mitigate these impacts	Moderate
	East Woodlands N43	Fragmentation and direct mortality due to	Major	Although the above overbridges will someway link these two	Major

Ecological Receptor	Habitat Area	Impact	Impact Significance	Site-specific Mitigation	Residual Impact Significance
Red Squirrel [cont'd]	(woodland 6) Standingstones Wood N35 (woodland 12)	RTAs during operation		woodlands, squirrels from these areas need to travel some distance to benefit. Therefore there is only a slight reduction in Fragmentation and Direct Mortality due to RTAs.	Moderate
	Monument Wood N47 (woodland 7)	Direct Mortality due to RTAs	Major	There are no overbridges in the vicinity of Monument Wood and squirrels are unlikely to use underpasses designed for Badger therefore this impact is not mitigated for. Direct mortality will be reduced by maintaining a 10 m wide verge adjacent to the road to deter squirrels form accessing the carriageway.	Major
		Fragmentation and disturbance causing abandonment	Major	Habitat creation to the N of the route will partially offset habitat loss and fragmentation. However, residual fragmentation impacts would remain.	Moderate
Fish	Bogenjoss Burn N37, N38, N40-N42, N45	Fragmentation and isolation due to fish stranding during construction of six culverts, prevention of migration upstream resulting in spawning habitat loss	Moderate	Fish to be removed prior to any de-watering, resulting in reduction of risk of fish being stranded. Culvert dimensions at downstream crossing of Bogenjoss Burn (ch320870) may result in residual impacts associated with the prevention of migration and fish passage.	Moderate at Bogenjoss Burn downstream crossing
Freshwater	Bogenjoss Burn N37, N38, N40-N42, N45	Provision of culvert at downstream crossing of Bogenjoss Burn (ch320870) would result in habitat loss and fragmentation of in-stream, bank and riparian habitats for 230m stretch of burn	Moderate	In-stream habitat loss will be offset by restoration of stream bed material to culvert. However, the culvert dimensions, will lead to residual impacts associated with bank and riparian habitat loss, and fragmentation of burn habitats.	Moderate at Bogenjoss Burn downstream crossing
Brown Hare	Agricultural land surrounding Howemoss N33	Permanent habitat loss, disturbance and fragmentation	Moderate	Mitigation to be provided for other species will partially mitigate for these impacts.	Minor
Section NL4					
Badger	Goval Burn and Goal Mill Lade N54, N60, N62 and N67	Disturbance and fragmentation of territory (groups NH, NI, NJ and NK) and riparian commuting habitat along Goval Burn during construction and operation	Moderate	Bridges at ch323610 and ch324620 and ch324400 at Park Hill aqueduct at ch323950, underpass at ch324400, bridge at ch324400 on Goval Mill Lade and culverts at ch325085 and the B977 link road, on Corsehill Burn will reduce fragmentation. Bridge with soft banks over River Don at ch323050-323370 will also reduce fragmentation. However fragmentation and severance are still a high magnitude impact.	Moderate
Otter	Corsehill Burn N64 and N66	Scheme would sever otter movements between Red Moss and the River Don during operation	Moderate	Construction of box culverts will allow otters to move freely between habitat areas. Culvert at Corsehill Burn are likely to result in residual fragmentation.	Moderate

Ecological Receptor	Habitat Area	Impact	Impact Significance	Site-specific Mitigation	Residual Impact Significance
Section NL5					
Red Squirrel	Corsehill Wood N71 (W8) Littlejohns WoodN72 (W8)	Direct mortality due to RTAs between foraging sites and fragmentation potentially affecting the viability of the population.	Major	Post survey the majority of this woodland has been felled. The habitat created as stated in the terrestrial habitat mitigation (Table 10.16) includes replanting the recently felled portions of Littlejohns wood. This reduces the habitat loss to Minor but there remains a long term fragmentation issue	Moderate
There are no further residual impacts of greater than Minor significance for any receptor in this section					

10.7 Post-project Appraisal

10.7.1 Monitoring is not generally required by law unless it forms part of the conditions for species licence. However, the inclusion of monitoring programmes is vital to provide a 'feedback loop' enabling evaluation of the predictions of the ES, the success of mitigation/compensation measures to be judged and post-development problems to be identified and rectified. As well as these 'project-specific' benefits, monitoring can also provide valuable information for use in future EIAs and for improving the science base of EIAs generally.

10.7.2 Monitoring of mitigation measures (i.e. the effectiveness of culverts and green bridges as mitigation of fragmentation for protected species) will be undertaken for 5 years after completion of the operational phase of the proposed scheme.

10.7.3 An Environmental Management Plan (EMP), although not required by UK EIA legislation, will be used to direct proposed EIA mitigation/compensation measures and monitoring procedures on site. It will include the following:

- prescriptions;
- work programme;
- schedules;
- an appropriate timescale;
- targets;
- monitoring programme;
- mechanism for reviewing the monitoring data; and
- provisions for remedial action if the mitigation/compensation/management targets are not achieved.

10.7.4 An outline EMP will be drawn up in consultation with statutory consultees and is expected to be published in the 2008. The completed EMP will be prepared and submitted to SNH and SEPA prior to construction. The EMP will incorporate Species Management Plans (SMPs) which will include details on habitat management and methodologies to promote long-term conservation objectives of protected species and habitats

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