Appendix A25.11 – Wintering Birds

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Jacobs U.K. Limited 95 Bothwell Street, Glasgow G2 7HX

Tel 0141 204 2511 Fax 0141 226 3109

Contents

Tables

1 Introduction

1.1 General Background

1.1.1 This report is one of the appendices supporting Chapter 25 (Ecology and Nature Conservation) of the AWPR Environmental Statement. This report is concerned with the impacts on bird assemblages associated with the Southern Leg section of the proposed scheme. Wintering birds in the context of this report are bird species that are found in the UK during the winter period, i.e.species native to the UK that are resident all year round and b) species that migrate to over-winter in the UK .The results of the surveys carried out for the purposes of this assessment are also presented and are shown on Figures A25.6a-h.

1.1.2 The six component route sections in this report for the Southern Leg of the proposed scheme are as follows:

- Section SL1: Charleston to Bishopston (ch207200 - 203150);
- Section SL2: Bishopston to Burnhead (ch203150 - 200600);
- Section SL3: Burnhead to the A93 (ch200600 - 102870);
- Section SL4: A93 to Beanshill (ch102870 - 105900);
- Section SL5: Beanshill to South Kingswells Junction (ch105900 - 108500); and
- Section SL6: South Kingswells Junction to Derbeth Overhills (ch108500 - 111200).

1.1.3 All tables and mapping are structured in this manner.

The Ecological Impact Assessment (EcIA) was undertaken in accordance with the Design Manual for Roads and Bridges (DMRB) Volume 10 and 11 (Highways Agency, 2001) and the Environmental Impact Assessment (Scotland) Regulations 1999, IEEM (2002) Guidelines for Ecological Impact Assessment along with cognisance of draft Institute of Ecology and Environmental Management (IEEM) guidelines (2006).

1.1.4 This assessment included desk-based consultation to collate existing information about wintering birds in the area affected by the scheme and field surveys to provide current data about the status of wintering bird populations.

Aims

1.1.5 The purpose of the assessment is to evaluate the current status of wintering bird populations in the vicinity study area, identify the potential impacts of the scheme, provide mitigation measures to ameliorate impacts and identify any residual impacts.

Study Area

1.1.6 For the purpose of this report, the study area is defined as 500m either side of the centreline of the route alignment.

1.2 Legislation and Conservation Status of Birds

National Legislative Protection

Wildlife and Countryside Act (1981) (as amended) & Conservation (Natural Habitats & c.) Regulations (1994)

1.2.1 The Wildlife and Countryside Act (1981) (as amended) (WCA) is the principal mechanism for the legislative protection of wildlife in Great Britain.

1.2.2 The Conservation (Natural Habitats & c.) Regulations 1994 is the means by which the Convention on the Conservation of European Wildlife and Natural Habitats (the 'Bern Convention') and the European Union Directives on the Conservation of Wild Birds (79/409/EEC, the 'Birds Directive') and Natural Habitats and Wild Fauna and Flora (92/43/FFC, the 'Habitat Directive') are implemented in Great Britain.

Nature Conservation (Scotland) Act 2004

1.2.3 The Nature Conservation (Scotland) Act 2004 (NCSA) implements a series of measures designed to improve the legal protection and enhance the conservation of the natural features of Scotland (natural features, in this context, refer to flora or fauna or geological or geomorphological features).

1.2.4 The NCSA comprises three parts: Part 1 introduces a general duty on public bodies to further the conservation of biodiversity in exercising any of their functions; Part 2 introduces significant changes to the existing arrangements for the establishment and protection of Sites of Special Scientific Interest (SSSIs); and Part 3 strengthens and extends the protection of birds, animals and plants by updating Part I of the WCA (1981).

1.2.5 Taken together, the WCA (1981) and NCSA (2004) ensure that all wild birds, their nests and eggs are protected, and make it an offence to;

- intentionally or recklessly kill, injure or take any wild bird;
- intentionally or recklessly take, damage or destroy the nest of any wild bird while it is in use or being built;
- intentionally or recklessly take or destroy the egg of any wild bird; or
- intentionally or recklessly disturb any wild bird listed on Schedule 1 while it is nest building or is at (or near) a nest with eggs or young; or disturb the dependent young of such a bird.

1.2.6 Wildlife and Countryside Act (1981) (as amended) Schedule 1 (WCA1i) bird species are protected by legal penalties at all times.

1.2.7 The acts additionally provide protection for Sites of Special Scientific Interest (SSSI) in particular those that are designated for the presence of wild bird populations.

UK Conservation Status of Birds

Biodiversity Action Plans

1.2.8 The UK Biodiversity Action Plan (UK BAP) was the UK's response to the commitments of the Rio Convention on Biological Diversity. The plan outlines action for 26 species of bird of conservation importance/concern and can be viewed at www.ukbap.org.uk.

1.2.9 In addition to having national priorities and targets, action for biodiversity was also taken at a local level. The local North East Scotland Biodiversity Partnership (LBAP) outlines action for 12 national and 22 local bird species and can be viewed at http://www.nesbiodiversity.org.uk/.

1.2.10 The Scottish Biodiversity Strategy (Scottish Executive, 2004) places a duty of care on public bodies to further the conservation of biodiversity in Scotland, the execution of which is implemented through the local biodiversity action plans (LBAPs).

1.2.11 National Planning Policy Guidance 14 (NPPG 14) outlines planning guidance in relation to the conservation and enhancement of Scotland's natural heritage. NPPG 14 makes the presence of a protected species or habitats in addition to biodiversity habitats/species a material consideration in the assessment of development proposals and requires planning authorities to take particular care to avoid harm to species or habitats protected under the Wildlife and Countryside Act (1981) (as amended), European Directives and/or identified as priorities in the UK Biodiversity Action Plan.

Scottish Biodiversity List

1.2.12 The Scottish Biodiversity List was developed to meet the requirements of Section 2 (4) of the Nature Conservation (Scotland) Act 2004 and includes a list of species and habitats considered to be of principal importance for the purposes of biodiversity in Scotland. The list provides a guide to empower decision-makers such as public bodies, including local authorities, to implement their duty to further the conservation of biodiversity in Scotland. At present, the Scottish Biodiversity List includes 93 species of bird and can be viewed at http://www.biodiversityscotland.gov.uk.

UK Birds of Conservation Concern 2002 - 2007

1.2.13 The leading government and non-government conservation organisations in the UK have jointly reviewed the population status of 247 bird species that are regularly found within the United Kingdom using data from national monitoring schemes.

1.2.14 On the basis of seven quantitative criteria, each species was placed on one of three lists, these being:

- Red (red list species are those that are globally threatened, have had an historical population decline in the UK from 1800-1995, a rapid (≥50%) decline in UK breeding population over the past 25 years or a rapid (≥50%) contraction of UK breeding range over the past 25 years);
- Amber (amber listed species have had an historical population decline from 1800-1995, but are recovering; population size has more than doubled over the past 25 years, a moderate (25-49%) decline in UK breeding population over the past 25 years, a moderate (25-49%) contraction of UK breeding range over the past 25 years, a moderate (25-49%) decline in UK non-breeding population over the past 25 years, or species with unfavourable conservation status in Europe also known as Species of European Conservation Concern (SPEC); and
- Green (green listed species have no identified threat to their population status).

1.2.15 Of the 247 species assessed, 40 species were red-listed, 121 were amber-listed and the remaining 86 were green-listed (UK Birds of Conservation Concern 2002-2007).

1.2.16 With respect to this report, key species of conservation concern include WCA (1981) Schedule 1i, JNCC Red List, JNCC Amber List, UK BAP, LBAP and local status species.

1.2.17 Additionally, the pink-footed goose (*Anser brachyrhynchus*) and greylag goose (*Anser anser*) are species of national importance during the passage and wintering periods and although not listed as either Annex 1, Schedule 1 or as an LBAP species, are considered in this chapter as a species of conservation concern. Both these species are listed on Annex II/1 and Annex II/2 of the Birds Directive as migratory species of conservation importance.

2 Approach and Methods

2.1 Previous Survey Information

2.1.1 Consultation was undertaken with a variety of statutory and non-governmental organisations including Aberdeen City Council (ACC), Aberdeenshire Council (AC), Scottish Natural Heritage (SNH), North East Scotland Biological Records Centre (NESBReC), The Scottish Ornithologists' Club (SOC), The Wildfowl and Wetland Trust (WWT), British Trust for Ornithology (BTO) and the Royal Society for the Protection of Birds (RSPB). These organisations were consulted regarding previous survey information/data and other bird records for the route corridor and wider study area.

2.2 Survey of Wintering Bird Assemblages

2.2.1 The following survey method section has been divided into two parts, the survey methods were developed by Jacobs ecologists, in consultation with SNH, from 2004 to 2006. The first part details the methods used to select and survey sites within the study area for wintering bird assemblages. The second part details the methods used to assess and evaluate habitats within the study area for wintering bird assemblages.

2.2.2 Field surveys were undertaken by experienced ornithological surveyors with extensive background in identifying birds from observations and from calls.

Development of Survey Strategy

2.2.3 A requirement to survey the route corridor of the proposed scheme for wintering bird populations in order to inform the assessment was identified through initial scoping with SNH in winter 2004.

2.2.4 A preliminary walkover survey of the study area was undertaken in early spring 2006 (following initial consultation with SNH) to assist in the development of an appropriate survey strategy to sample the route corridor for wintering birds.

2.2.5 When developing the survey strategy it was determined through professional judgment together with consultation with SNH that a full survey of the entire route corridor of the proposed scheme for wintering bird assemblages would be impractical. It was agreed to survey the route corridor by targeting high value wintering habitat comprising large waterbodies within or adjacent to the route corridor. The remaining terrestrial areas were sampled using a Line Transect and Quadrat sampling approach, in addition to collecting incidental records of wintering or migratory waders, wildfowl or geese seen in agricultural areas, wetlands and areas of water. These methods aimed to provide a 'best value' approach where the survey effort produced a level of baseline information that could be practically achieved while also being sufficient to allow the impacts on bird assemblages to be appropriately assessed.

2.2.6 The two-stage wintering bird survey (WBS) strategy detailed below was developed using survey standards outlined in Bird Census Techniques (Bibby et al., 1992) and Bird Monitoring Methods (Gilbert et al., 1998). All methods were agreed through consultation with SNH in the form of an Ecology Scoping Report (Jacobs, 2006), prior to survey.

<u>Selection of Survey Areas – WOVs</u>

2.2.7 The first stage in the selection of survey areas involved the identification and selection of waterbodies that are of high value to wintering geese, waders and wildfowl (referred to as Waterbodies of Ornithological Value (WOVs)) located within and/or adjacent to the study area. These were identified during the initial walkover survey and through an assessment of data supplied by the North East Scotland Biological Records Centre (NESBReC) as well as through an

analysis of aerial photographs and Ordnance Survey maps. Consultation responses. Preliminary survey work did not identify any WOVs within or adjacent to the study area for the Southern Leg route corridor.

2.2.8 Five counts were undertaken at each identified WOV once a month, at dawn, midday and dusk from October 2006 to February 2007. All wildfowl, geese and wading species using the waterbodies and shoreline were recorded from a vantage point near to the edge of the waterbody. Birds flying overhead were recorded, but not included in the data analyses as they were not considered to be using the waterbodies. Loirston Loch WOV was subject to a previous wintering bird survey conducted from October 2004 to February 2005 during the assessment of a former route alignment. The results from that survey were also considered in this assessment.

Selection of Survey Areas – Remaining Habitats

2.2.9 The second stage in the selection of survey areas involved the use of a Line Transect and Quadrat sampling system to sample habitats (outside of the WOVs) throughout the remainder of the 500m study area for wintering bird species. The Quadrat data, in addition to data of waterbody counts, were used to infer the importance of all remaining non-surveyed areas throughout the route corridor for wintering birds.

2.2.10 A single transect was established, centred over the route alignment (based on route option plans dated 23 January 2006), along which 500m square Quadrats were established. A sampling ratio of 1:3 was used resulting in 12 Quadrats being selected along the length of the transect. This level of sampling was considered to provide field survey data of sufficient representation to allow an effective evaluation of the ecological importance of the wintering bird assemblages found in these areas and the remainder of the study area.

2.2.11 It should be noted that the difference in number of breeding and wintering Quadrats is attributed to changes to the route alignment in the intervening period between undertaking the breeding bird surveys and starting the wintering bird surveys.

2.2.12 The standard mapping census technique as developed by the British Trust for Ornithology (BTO) (Bibby et al., 2000) was used to survey Quadrats for wintering bird species. Quadrats were subject to five WBS undertaken between October 2006 and February 2007. Observations of territorial behaviour (such as singing) were recorded but it was not considered that any birds were breeding. All species were recorded onto 1:10,000 site maps using standard BTO species codes, flight direction and flock size were included where appropriate to help minimise the potential for double counting. Adverse weather conditions such as strong wind, persistent rain, and dense fog were avoided. The survey did not include urban habitats, including areas of road and/or hardstanding and/or residential gardens.

2.2.13 Approximately 32% (300ha) of the study area was surveyed for wintering birds using the Line Transect and Quadrat sampling system.

Incidental Records

2.2.14 Incidental observations of bird species listed in Birds Directive Annex 1, WCA Schedule 1, JNCC Red/Amber, UK/LBAP, in addition to any migratory species of conservation importance included on Annex II/1 and Annex II/2 of the Birds Directive present within or adjacent to each of the Quadrats, and within the wider study area, were recorded using BTO species codes. These included incidental observations of any wintering waders, wildfowl or geese in agricultural fields, any associated wetlands and areas of water within 250m either side of the proposed scheme.

Dates of Survey

2.2.15 The reconnaissance surveys were undertaken from 23 to 26 January 2006. The wintering bird surveys were undertaken from 9 to 11 October 2006, 21 to 23 November 2006, 12 to 14 December 2006, 16 to 18 January 2007 and 13 to 15 February 2007.

2.3 Habitat Assessment

Habitat Value

2.3.1 Information obtained from the Phase 1 Habitat Survey (Appendix A25.1) was used to inform a description of the habitats represented within each WOV and Quadrat and assess their value for birds. A habitat value (expressed as high, medium or low) was assigned to each WOV, Quadrat and Ecological Habitat Area (as described in the Phase 1 Habitat Report, Appendix C25.1) based on the habitat descriptions derived from the Phase 1 Habitat Survey and following the criteria shown in Table 1.

Table 1 – Habitat Assessment Criteria

Habitat Value	Criteria
High	Habitats offering abundant good quality foraging opportunities for wintering birds.
Medium	Habitats offering scattered and/or localised foraging opportunities for wintering birds.
Low	Habitats offering occasional or limited foraging opportunities for wintering birds.

2.4 Evaluation of Ecology and Nature Conservation Value

2.4.1 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 statutory and non-statutory site designations, the results of consultation, literature review (including reference to the North-East Scotland Bird Report (North-East Scotland Bird Club, 2004) and The Birds of North-East Scotland (Buckland, et al., 1990)) 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 2, which are based on the Ratcliffe Criteria (Ratcliffe, 1977) used in the selection of biological SSSI and include size (extent), naturalness, rarity, typicality, vulnerability and position in an ecological / geographical unit.

2.4.2 The evaluation method additionally includes reference to the legal protection conferred on species or habitats as well as the conservation status of the receptor, such as presence of UK BAPs or LBAPs. These factors give rise to a level of conservation importance being assigned to species/habitats that reflects the geographical framework used in the evaluation process. Thus, for example, Birds Directive Annex 1 species such as kingfisher that are protected by international legislation are referred to as internationally important in terms of their conservation status. Other species such as twite, which are identified as priority species in the North-East Scotland Biodiversity Action Plan (NES BAP) are referred to as regionally important species.

Table 2 – Evaluation of Ecological Receptor

Site Importance	Site Attributes
International (European)	**Habitats** An internationally designated site or candidate site (SPA, pSPA, SAC, cSAC, Ramsar site, Biogenetic/Biosphere Reserve, World Heritage Site) or an area which meets the published selection criteria for such designation, irrespective of whether or not it has yet been notified 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 an internationally important species, which is threatened or rare in the UK. i.e. a UK Red Data Book species or listed as occurring in 15 or fewer 10km squares in the UK (categories 1 and 2 in the UK BAP) or of uncertain conservation status or of global conservation concern in the UK BAP A regularly occurring, nationally significant population/number of any internationally important species.
National (Scottish)	**Habitats** A nationally designated site (SSSI, ASSI, NNR, Marine Nature Reserve) or a discrete area, which meets the published selection criteria for national designation (e.g. SSSI selection guidelines) irrespective of whether or not it has yet been notified A viable area of a priority habitat identified in the UK BAP, or of 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** A regularly occurring, regionally or county significant population/number of an internationally/nationally important species Any regularly occurring population of a nationally important species which is threatened or rare in the region or county (see local BAP) A feature identified as of critical importance in the UK BAP.
Regional (North East Scotland)	**Habitats** Sites which exceed the county-level designations but fall short of SSSI selection guidelines, where these occur Viable areas of key habitat identified in the Regional BAP or smaller areas of such habitat which are essential to maintain the viability of a larger whole Viable areas of key habitat identified as being of regional value in the appropriate SNH Natural Heritage Future area profile 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 16-100 10km squares in the UK or in a Regional BAP or relevant SNH Natural Heritage Future area on account of its regional rarity or localisation A regularly occurring, locally significant population/number of a regionally important species. Sites maintaining populations of internationally/nationally important species that are not threatened or rare in the region or county.
Authority Area (e.g. County or District **Aberdeenshire/ City of Aberdeen**	**Habitats** Sites that are recognised by local authorities (e.g. Sites of Interest for Nature Conservation (SINS) and District Wildlife Sites (DWS)) County/District sites that the designating authority has determined meet the published ecological selection criteria for designation, including Local Nature Reserves (LNR) selected on county/district ecological criteria (county/district sites where they exist, will often have been identified in local plans) A viable area of habitat identified in County/District BAP or in the relevant SNH Natural Heritage Future Area profile

Site Importance	Site Attributes
	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 which is listed in a County/District BAP on account of its regional rarity or localisation A regularly occurring, locally significant population of a county/district important species (particularly during a critical phase of its life cycle) Sites supporting populations of internationally/nationally/regionally important species that are not threatened or rare in the region or county, and are not integral to maintaining those populations. Sites/features that are scarce within the county/district or which appreciably enrich the county/ district habitat resource
Local (immediate local area or village importance)	**Habitats** Areas of habitat considered to appreciably enrich the habitat resource within the local context (survey area, parish or neighbourhood, 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 of such habitats 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. Any 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 value)	Sites that retain habitats and/or species that are of limited ecological importance due to their size, species composition or other factors. Any river classified as impoverished D and/or and with a Habitat Modification Score indicating that it is severely modified

Evaluation of WOVs, Quadrats and Habitat Areas

2.4.3 The ecological value of each WOV and Quadrat for wintering birds was determined by considering the evaluation of its habitat potential for wintering birds (derived from information in Appendix A25.1: Terrestrial Habitats) combined with the value of the wintering bird assemblage present.

2.4.4 An assessment was made of how representative the habitats found in each WOV and/or Quadrat were in relation to the adjacent non surveyed areas . The ecological value of the remaining Habitat Areas, out with the survey, in each route section was then evaluated by an initial determination of their habitat potential for wintering birds. The information regarding the wintering bird assemblages found in adjacent WOVs or Quadrats input to the evaluation.

2.5 Impact Assessment

2.5.1 In the assessment of significance of impact, consideration has been given both to the magnitude of impact and to the sensitivity of the receiving environment or species. The sensitivity of a feature was determined with reference to its level of importance although other elements have been taken into account, where appropriate.

Impact Magnitude

2.5.2 Methods of impact prediction 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. Magnitude criteria are presented in Table 3 and include positive impact criteria in accordance with IEEM guidance (2002).

Table 3 – Magnitude of 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 (at a regional or higher level).
Medium negative	The change is not likely to permanently adversely affect the ecological receptor's integrity but the effect on the receptor is likely to be substantial in terms of its ecological structure and function and may change its evaluation. Likely to result in changes in the localised distribution of a species but not affect its population status at a regional level.
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 change its evaluation.
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, but may not improve its evaluation
High positive	The change is likely to restore an ecological receptor to favourable conservation status, or to create a feature of recognisable value (at a regional or higher level).

Impact Significance

2.5.3 The significance of an impact has been determined according to the matrix system illustrated in Table 4. Impacts can be beneficial or adverse, either improving or decreasing the ecological status health or viability of a species, population or habitat.

2.5.4 Typically, negative impact significance greater than or equal to Moderate would require mitigation to be undertaken to ameliorate the impact significance to acceptable levels.

Table 4 – Impact Significance

Magnitude / Importance	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
County	Moderate	Moderate	Minor	Negligible	Minor	Moderate
Local	Minor	Minor	Minor	Negligible	Minor	Minor
Less than Local	Minor	Negligible	Negligible	Negligible	Negligible	Negligible

2.5.5 The level of significance of impacts predicted on ecological receptors is an important factor in influencing the decision-making process and determining the necessity and/or extent of mitigation measures. Impacts can be beneficial or adverse, either improving or decreasing the ecological status health or viability of a species, population or habitat.

2.6 Limitations to Assessment

Survey Timing

2.6.1 The wintering bird surveys of the proposed scheme were undertaken during the months of October 2006 to February 2007 which is the optimal 'core' period in which to undertake wintering bird surveys.

Weather

2.6.2 It has been shown that wind and rain are the two main factors that can limit the number of bird registrations recorded during a breeding bird survey (Gilbert et al., 1998) and this has been assumed for the wintering bird survey.

2.6.3 The weather conditions throughout the duration of the survey period were moderate to good with limited rain, snow and wind and moderate cloud cover. Surveys were suspended if weather conditions were poor (e.g. high winds, heavy snow and persistent rain). Wind speed was relatively high on some days (approximately 10% of survey days), which is likely to have reduced records of singing/calling birds. However, carrying out several survey visits at a site helps to reduce the significance of such effects. All surveys were carried out in suitable weather, although it was not practically possible to limit surveys to only to optimal weather conditions. It is considered that the assemblages recorded during the surveys of the WOV and Quadrats provide a comprehensive representation of the wintering birds present within this section of the route corridor.

Survey Methodology

2.6.4 The wintering bird survey methodology which was included in the scoping report (Jacobs, 2006) and which is supported by SNH in their current guidance (SNH, 2005) was approved prior to the start of the surveys by SNH.

Changes to the Route Alignment

2.6.5 Minor changes to the route alignment occurred subsequent to the start of the WBS, these changes could not be incorporated into the WBS because a WBS relies on consistency in terms of site boundaries/areas between survey repetitions (Bibby et al., 2000). As a result, the revised route corridor is likely to contain habitats of value to wintering birds that have not been included or surveyed as part of this WBS. However, part of the rationale behind using the Quadrat and Line Transect method was that it systematically sampled a range of habitats throughout the route corridor and therefore while small areas outside of WOVs and Quadrats may have gone un-surveyed it is likely that they are not going to differ significantly from those areas surveyed and therefore the value of these un-surveyed habitats can be inferred from the evaluation of WOVs/Quadrats.

3 Baseline

3.1 Consultation

3.1.1 SNH did not provide records of key wintering bird species for the proposed scheme in their consultation response. However, consultation with Aberdeen City Council identified Loirston Loch as a District Wildlife Site.

3.1.2 Consultation with the RSPB did not identify the presence of any RSPB nature reserves or provide any previous records of wintering bird species within or adjacent to the proposed scheme study area.

3.1.3 Previous records of key wintering bird species and assemblages within the route corridor were obtained from the BTO and WWT in 2005.

3.1.4 The North-East Scotland Bird Report (2005) provided information regarding the wintering species found within the study area.

3.2 Incidental Observations

3.2.1 Table 5 presents incidental records of waders or wildfowl species (recorded either in agricultural fields or flying over the study area.

Table 5 –Incidental Records of Waders, Wildfowl and Geese

Habitat Section	Month/Year	Species Name	Status	Location (NGR)	Habitat Area	Comment
SL1	January 2007	curlew	Ψ+	NO922995	S4,S8	Eight recorded in flight near to Greenhowe Woods
	February 2007	pink-footed goose	+	NO911983	S4, S8	1600 recorded feeding in field near to Greenhowe Woods
	January 2007	pink-footed goose	+	NO899999	S10, S13	350 recorded in flight over Hare Moss
	February 2007	pink-footed goose	+	NO900995	S10, S13	150 pink-footed geese recorded in flight to the south of Hare Moss, 75 lapwing and 28 curlew recorded feeding in a field near Hare Moss
		lapwing	+			
		curlew	Ψ+			
SL3	February 2007	pink-footed goose	+	NO875981	S15, S16, S17, S20	35 pink-footed geese and 35 greylag geese grazing in a field near to Burnhead
		greylag goose	+			
	February 2007	pink-footed goose	+	NO863995	S22, S23	80 pink-footed geese flying over Quadrat in a North-easterly direction
SL6	October 2006	pink-footed goose	+	NJ855075	S46, S48	50 recorded flying north near to Cloghill
	October 2006	pink-footed goose	+	NJ857078	S46, S48	50 recorded flying over Cloghill

Status Key % = WCA1i; x = JNCC Red List; + = JNCC Amber List; & = UKBAP; Ψ = LBAP

3.3 Survey of Wintering Bird Assemblages

Waterbodies of Ornithological Value (WOVs)

3.3.1 A single WOV (Loirston Loch DWS) was identified within or adjacent to the Southern Leg study area (refer to Figure 25.1a). Loirston Loch lies in a suburban setting in the south of Aberdeen, adjacent and to the north of Charleston (grid reference NJ938010). Consultation with the WWT and BTO (see Section 0) confirmed that Loirston Loch is host to large numbers of wintering pink-footed and greylag geese. In addition to the data collected from the current wintering bird survey for 2006-2007, this report also considers the results of the previous wintering bird survey, (conducted between November 2004 and March 2005), in order to determine the loch's importance for over-wintering wintering geese and wildfowl.

3.3.2 Table 6 and Table 7 show the total number of wintering geese, waders, wildfowl and birds of conservation concern recorded at Loirston Loch at dawn, midday and dusk between November 2004 and March 2005 and October 2006 and February 2007.

Table 6 – Number of Wintering Geese, Waders, Wildfowl and Birds of Conservation Concern Recorded at Loirston Loch during Dawn (da), Midday (md) and Dusk (du) Counts 2004-2005

Date	Status	12/11/2004			22/12/2004			13/01/2005			03/02/2005			17/03/2005		
Time of day / Species		da	md	du	da	md	du	da	md	du	da	md	du	da	md	du
Black-headed gull	+	4	5	-	-	14	-	12	15	5	-	-	48	-	-	-
Common gull	+	-	-	-	60	50	60	-	-	-	-	-	20	-	-	-
Coot	-	3	5	6	10	13	13	18	22	15	35	34	25	25	15	32
Cormorant	+ &	3	-	-	1	1	-	5	-	2	2	4	1	3	1	1
Curlew	+ Ψ	3	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Goldeneye	-	-	-	-	1	-	-	10	3	2	9	12	8	4	1	-
Goosander	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Great crested grebe	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-
Greater black-backed gull	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grey heron	-	1	1	1	2	1	-	-	-	-	1	2	-	1	-	1
Greylag goose	+	-	-	-	-	-	-	-	-	-	500	-	44	4577	-	5000
Herring gull	+	10	20	-	-	-	-	-	15	1	-	-	22	-	-	-
Lapwing	+	-	-	-	18	-	22	-	5	-	14	-	18	-	-	-
Little grebe	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lesser black-backed gull	-	3	-	-	-	2	-	3	-	-	-	-	-	-	-	-
Mallard	-	2	4	6	19	14	26	6	10	4	16	8	4	4	-	2
Mute swan	+	7	-	5	2	2	3	5	-	-	2	2	1	1	2	-
Oystercatcher	+	-	-	-	-	-	-	-	-	-	-	-	-	2	-	1
Pink-footed goose	+	78	-	-	55	-	-	-	-	-	2550	-	2420	508	-	-
Pochard	+	3	4	3	2	2	-	8	8	6	7	9	4	-	4	4
Teal	+	-	5	-	-	-	-	-	-	-	-	2	3	5	-	-
Tufted duck	-	10	8	12	12	18	7	48	36	28	32	41	28	39	20	21
Wigeon	+	-	-	-	-	-	-	-	-	-	-	4	42	-	-	-

Key: f = frequency; m = maximum count (survey visit number in brackets) % = WCA1i; x = JNCC Red List; + = JNCC Amber List; & = UKBAP; Ψ = LBAP

Table 7 – Number of Wintering Geese, Waders, Wildfowl and Birds of Conservation Concern Recorded at Loirston Loch during Dawn (da), Midday (md) and Dusk (du) Counts 2006-2007

Date	Status	10/2006			11//2006			12/2006			01/2007			02/2007		
Time of day / Species		da	md	du	da	md	du	da	md	du	da	md	du	da	md	du
Barn Owl	& +	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Black-headed gull	+	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Common gull	+	-	20	-	-	-	-	-	2	-	-	2	4	-	2	-
Coot	-	-	2	2	9	7	11	25	30	26	29	35	34	25	25	29
Cormorant	+ &	-	-	-	2	4	2	2	-	-	-	-	-	-	-	-
Goldeneye	-	-	-	-	-	-	-	3	4	7	2	4	-	1	4	2
Grey heron	-	-	3	4	-	1	2	1	-	1	-	-	-	-	-	-
Greylag goose	+	-	-	-	-	-	-	-	-	-	300	-	300	320	-	170
Herring gull	+	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Kingfisher	% +	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Lapwing	+	-	-	-	-	-	-	-	2	-	2	3	-	-	-	-
Little Grebe	-	-	5	4	2	1	1	5	2	-	-	-	-	-	-	-
Mallard	-	-	5	2	26	20	9	13	8	21	5	16	15	17	15	16
Moorhen	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Mute swan	+	-	2	2	2	6	6	5	5	5	2	2	2	2	2	2
Oystercatcher	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pink-footed goose	+	-	-	-	-	-	-	-	-	-	-	-	-	1200	-	80
Pochard	+	-	16	22	-	-	6	7	1	8	2	-	2	5	4	4
Reed Bunting	x & Ψ	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Teal	+	-	-	3	-	150	-	-	3	11	7	11	15	-	-	3
Tufted duck	-	-	5	9	6	30	5	35	29	17	24	21	-	41	27	52
Wigeon	+	-	-	-	104	-	95	127	137	122	107	108	98	29	65	50

Key: f = frequency; m = maximum count (survey visit number in brackets) % = WCA1i; x = JNCC Red List; + = JNCC Amber List; & = UKBAP; Ψ = LBAP

Quadrat Survey

3.3.3 A total of 12 Quadrats were established within the Southern Leg study area [Figures 25.6a-g]. The location of each of the Quadrats is provided in Table 8.

Table 8 – Location of Quadrats

Quadrat	Section	Grid Reference
SL-Wb01	SL1	NJ 933 005
SL-Wb02	SL1	NO 929 997
SL-Wb03	SL1	NO 919 997
SL-Wb04	SL1	NO 904 999
SL-Wb05	SL2	NO 886 988
SL-Wb06	SL2	NO 871 985
SL-Wb07	SL3	NO 858 995
SL-Wb08	SL4	NJ 851 010
SL-Wb09	SL4	NJ 848 025
SL-Wb10	SL5	NJ 846 041
SL-Wb11	SL5	NJ 849 056
SL-Wb12	SL6	NJ 859 073

3.3.4 Table 9 shows the frequency (number of times seen on each survey visit, these are labelled I-V respectively) and maximum count of wintering bird species recorded in each Quadrat during each of the five survey visits and includes those roosting or feeding, in addition to wintering birds seen flying over the Quadrat. Scientific names of bird species are presented in Annex 1.

Table 9 – Wintering Bird Species Recorded within Quadrats SL-Wb01-12.

Quadrat / Species present	Status	Wb01		Wb02		Wb03		Wb04		Wb05		Wb06	
		F	M	F	m	F	m	f	m	f	m	f	m
Blackbird	-	IV	2 (2)	II	4 (2)	IV	1 (2-5)	II	14 (4)	I	1 (1,5)	V	4 (3)
Black-headed gull	x +	-	-	I	1 (2)	-	-	-	-	-	-	-	-
Blue Tit	-	-	-	I	4 (2)	IV	4 (3,4)	IV	2 (2,4)	II	3 (5)	IV	10 (2,5)
Bullfinch	x & Ψ	-	-	-	-	-	-	I	8 (2)	-	-	-	-
Buzzard	-	I	1 (2)	-	-	I	1 (2)	II	1 (1,2)	I	1 (3)	III	(1,2,4)
Carrion Crow	-	IV	8 (5)	I	5 (2)	III	6 (1)	IV	2 (1,3,5)	I	1 (1)	IV	4 (1,4)
Chaffinch	-	-	-	I	6 (2)	III	3 (5)	I	3 (4)	III	2 (2)	IV	11 (4)
Coal Tit	-	-	-	-	-	II	3 (2)	-	-	II	3 (1)	IV	6 (5)
Common Gull	+ &	-	-	I	6 (2)	I	2 (2)	II	3 (2)	I	3 (2)	-	-
Common Sandpiper	-	-	-	-	-	-	-	-	-	-	-	I	1 (4)
Coot	-	I	4 (5)	-	-	-	-	-	-	-	-	-	-
Crossbill	%	-	-	-	-	-	-	-	-	I	5 (3)	-	-
Curlew	+ Ψ	I	1 (5)	-	-	-	-	I	15 (3)	-	-	-	-
Dunnock	+	I	1 (3)	-	-	II	5 (2)	I	1 (4)	IV	2 (1,4)	I	1 (1)
Feral Pigeon	-	-	-	I	160 (1)	-	-	-	-	-	-	-	-
Fieldfare	% +	-	-	-	-	II	6 (5)	II	60 (5)	I	80 (3)	I	128 (3)
Goldcrest	+	I	4 (2)	-	-	IV	6 (3)	-	-	III	7 (12)	III	3 (1)
Goldfinch	-	-	-	I	10 (1)	I	2 (5)	II	2 (5)	-	-	I	1 (5)
Great Tit	-	-	-	I	1 (2)	I	2 (4)	I	2 (2)	I	4 (5)	IV	9 (5)
Greylag Goose	+	-	-	-	-	-	-	-	-	I	12 (5)	I	17 (5)
Herring Gull	+	II	4 (5)	II	20 (5)	-	-	I	1 (1)	-	-	-	-

Quadrat / Species present	Status	Wb01		Wb02		Wb03		Wb04		Wb05		Wb06	
		F	M	F	m	F	m	f	m	f	m	f	m
House Sparrow	x	-	-	II	8 (2)	-	-	-	-	II	3 (2)	I	1 (1)
Jackdaw	-	-	-	-	-	I	3 (2)	-	-	-	-	-	-
Jay	-	-	-	-	-	-	-	-	-	-	-	III	1 (1,4,5)
Kestrel	+ Ψ	-	-	I	1 (2)	I	1 (1)	I	1 (2)	I	2 (1)	-	-
Lapwing	+	I	4 (5)	-	-	-	-	-	-	I	80 (3)	-	-
Long-tailed tit	-	-	-	-	-	-	-	I	9 (3)	-	-	-	-
Magpie	-	III	2 (1,4)	III	2 (1)	-	-	-	-	-	-	II	2 (3)
Mallard	-	III	6 (3,5)	I	2 (3)	-	-	I	6 (4)	-	-	-	-
Meadow Pipit	+	IV	12 (5)	III	3 (1)	I	1 (1)	IV	11 (2)	I	3 (2)	I	4 (5)
Mistle Thrush	+	-	-	-	-	I	1 (5)	-	-	II	2 (2,5)	I	1 (1)
Moorhen	-	I	1 (3)	-	-	-	-	-	-	-	-	-	-
Pheasant	-	-	-	-	-	-	-	III	2 (3)	-	-	-	-
Pied Wagtail	-	I	1 (5)	-	-	-	-	III	3 (3)	-	-	-	-
Pink-footed Goose	+	I	2 (5)	-	-	I	5 (4)	I	17 (4)	I	80 (4)	-	-
Redwing	% +	-	-	-	-	-	-	II	6 (4)	I	100 (5)	-	-
Reed Bunting	x & Ψ	I	1 (3)	II	2 (2)	-	-	-	-	-	-	I	1 (1)
Robin	-	I	1 (5)	I	2 (2)	-	-	I	1 (2)	III	3 (1)	IV	6 (5)
Rook	-	-	-	-	-	-	-	II	18 (4)	-	-	-	-
Skylark	x & Ψ	-	-	I	2 (5)	-	-	-	-	-	-	-	-
Snipe	+ Ψ	I	1 (4)	II	4 (4)	II	4 (1)	II	3 (2)	I	1 (5)	-	-
Song Thrush	x & Ψ	I	1 (2)	-	-	-	-	-	-	I	1 (1)	-	-
Sparrowhawk	-	-	-	-	-	I	1 (5)	-	-	-	-	-	-

Quadrat / Species present	Status	Wb01		Wb02		Wb03		Wb04		Wb05		Wb06	
		F	M	F	m	F	m	f	m	f	m	f	m
Starling	x	I	20 (1)	II	16 (2)	-	-	III	100 (5)	III	10 (2)	II	50 (3)
Stock Dove	+	-	-	-	-	II	2 (1,2)	-	-	I	2 (1)	-	-
Stone Chat	+	-	-	IV	4 (4)	-	-	-	-	-	-	I	1 (4)
Teal	+	II	20 (4,5)	-	-	-	-	-	-	-	-	-	-
Tree Creeper	-	-	-	-	-	-	-	-	-	-	-	I	2 (1)
Unidentified Thrush	-	-	-	-	-	-	-	-	-	-	-	I	11 (3)
Wigeon	+	II	9 (5)	-	-	-	-	-	-	-	-	-	-
Wood Pigeon	-	I	2 (1)	I	6 (2)	IV	56 (5)	II	6 (1)	II	17 (2)	IV	17 (2)
Woodcock	+	-	-	-	-	-	-	I	1 (3)	-	-	-	-
Wren	-	III	2 (12)	IV	2 (2,4)	V	8 (5)	IV	5 (4)	IV	4 (4,5)	IV	3 (2,5)

Quadrat / Species present	Status	Wb07		Wb08		Wb09		Wb10		Wb11		Wb12	
		f	m	F	m	F	m	f	m	f	m	f	M
Blackbird	-	III	6 (4)	V	9 (3)	IV	2 (2)	II	2 (2)	IV	3 (2)	III	4 (2)
Black-headed Gull	x +	-	-	II	24 (1)	I	30 (2)	-	-	-	-	-	-
Blue Tit	-	V	10 (3,5)	IV	6 (5)	V	3 (3)	IV	3 (5)	IV	8 (5)	V	13 (4)
Bullfinch	x & Ψ	II	3 (3)	I	1 (3)	-	-	I	2 (2)	I	2 (2)	-	-
Buzzard	-	II	2 (3)	I	2 (2)	II	1 (2,3)	V	3 (3,4)	IV	2 (2,3,5)	I	1 (1)
Carrion Crow	-	II	2 (1,2)	V	9 (5)	II	17 (1)	V	4 (4)	II	11 (1)	-	-
Chaffinch	-	II	9 (2)	IV	7 (5)	V	7 (5)	III	6 (5)	V	6 (3)	V	21 (4)
Coal Tit	-	III	4 (4)	-	-	I	1 (5)	II	4 (5)	IV	8 (5)	III	5 (2,4)
Collared Dove	-	-	-	-	-	I	5 (4)	-	-	-	-	-	-
Common Gull	+	I	1 (2)	-	-	-	-	I	144 (1)	I	10 (1)	I	66 (1)

Quadrat / Species present	Status	Wb07		Wb08		Wb09		Wb10		Wb11		Wb12	
		f	m	F	m	F	m	f	m	f	m	f	M
Curlew	+ Ψ	I	1 (2)	-	-	-	-	-	-	-	-	-	-
Dunnock	+	I	3 (1)	III	5 (5)	II	3 (1,5)	II	1 (3,4)	II	2 (1,5)	III	2 (5)
Fieldfare	% +	-	-	I	1 (4)	I	50 (4)	-	-	-	-	I	1 (4)
Goldcrest	+	V	6 (3)	II	2 (3)	I	1 (4)	-	-	IV	3 (2,5)	II	3 (3)
Goldfinch	-	-	-	I	2 (5)	-	-	II	1 (3,5)	-	-	III	3 (5)
Great Spotted Woodpecker	-	I	1 (4)	-	-	-	-	II	2 (1)	I	1 (4)	II	1 (4,5)
Great Tit	-	V	12 (4)	IV	4 (5)	V	8 (3)	II	5 (5)	IV	12 (5)	III	10 (1,3)
Greenfinch	-	-	-	-	-	I	8 (5)	-	-	-	-	I	3 (1)
Grey Partridge	x & Ψ	II	1 (3,5)	-	-	-	-	-	-	I	1 (4)	-	-
Grey Wagtail	+	-	-	I	1 (1)	-	-	-	-	-	-	-	-
Greylag Goose	+	-	-	-	-	-	-	-	-	I	25 (4)	-	-
Herring Gull	+	-	-	I	2 (1)	II	80 (5)	I	1 (1)	-	-	I	4 (1)
House Sparrow	x	-	-	-	-	I	10 (5)	-	-	-	-	-	-
Jackdaw	-	II	4 (1,2)	IV	23 (5)	-	-	II	10 (3)	-	-	I	3 (1)
Jay	-	II	1 (1,2)	-	-	-	-	-	-	-	-	-	-
Kestrel	+ Ψ	-	-	-	-	-	-	-	-	-	-	I	1 (2)
Linnet	x & Ψ	-	-	-	-	-	-	-	-	-	-	I	4 (3)
Long-eared Owl	-	-	-	-	-	-	-	-	-	I	1 (5)	-	-
Magpie	-	III	2 (2)	III	2 (5)	IV	4 (2)	V	17 (5)	I	1 (5)	II	1 (2,5)
Mallard	-	-	-	I	1 (2)	-	-	-	-	-	-	I	1 (5)
Meadow Pipit	+	-	-	I	1 (1)	I	2 (1)	I	1 (1)	I	3 (1)	-	-
Mistle Thrush	+	II	2 (5)	II	2 (5)	-	-	II	1 (1,2)	I	1 (4)	I	1 (3)
Oystercatcher	+	-	-	-	-	I	4 (5)	-	-	-	-	-	-

Quadrat / Species present	Status	Wb07		Wb08		Wb09		Wb10		Wb11		Wb12	
		f	m	F	m	F	m	f	m	f	m	f	M
Pheasant	-	-	-	-	-	-	-	I	1 (4)	I	5 (2)	IV	5 (4)
Pied Wagtail	-	-	-	-	-	-	-	I	1 (3)	-	-	I	1 (3)
Pink-footed Goose	+	II	80 (5)	-	-	-	-	-	-	II	300 (4)	-	-
Redwing	% +	I	8 (4)	-	-	-	-	-	-	I	150 (4)	III	20 (4)
Robin	-	V	4 (1,5)	III	6 (5)	II	4 (5)	II	2 (1,5)	III	5 (5)	III	8 (5)
Rook	-	-	-	III	45 (3)	I	1 (2)	-	-	I	2 (2)	IV	22 (4)
Skylark	x & Ψ	-	-	-	-	I	2 (4)	-	-	I	2 (1)	-	-
Snipe	+ Ψ	-	-	-	-	-	-	I	2 (2)	-	-	-	-
Song Thrush	x & Ψ	-	-	I	1 (2)	I	1 (2)	I	1 (2)	I	3 (2)	I	2 (2)
Sparrowhawk	-	-	-	-	-	-	-	I	1 (4)	-	-	-	-
Starling	x	-	-	-	-	III	82 (3)	-	-	I	150 (3)	-	-
Stock Dove	+	-	-	-	-	-	-	-	-	-	-	I	3 (1)
Stone Chat	+	-	-	-	-	-	-	I	2 (3)	-	-	I	1 (2)
Treecreeper	-	III	1 (2,3,4)	I	1 (2)	-	-	-	-	-	-	-	-
Twite	x	-	-	-	-	-	-	-	-	-	-	I	7 (4)
Unidentified Finch	-	I	2 (3)	-	-	-	-	-	-	-	-	-	-
Unidentified Thrush	-	-	-	-	-	-	-	-	-	-	-	I	6 (3)
Wood Pigeon	-	V	25 (4)	II	18 (3)	II	2 (4,5)	IV	18 (3)	III	4 (2)	V	8 (2,4)
Woodcock	+	-	-	-	-	I	1 (5)	II	1 (2,3)	-	-	-	-
Wren	-	III	2 (1-3)	IV	2	IV	3 (5)	II	2 (4)	III	7 (5)	V	4 (2,5)
Yellowhammer	x Ψ	-	-	-	-	II	8 (3)	-	-	-	-	-	-

Key: f = frequency; m = maximum count (survey visit number in brackets); % = WCA1i; x = JNCC Red List; + = JNCC Amber List; & = UKBAP; Ψ = LBAP

Monthly Summary of Key Species Recorded in Quadrats

October 2006

3.3.5 A moderate assemblage of common species was recorded. However, no wintering geese or significant numbers of key species were recorded in the Quadrats.

November 2006

3.3.6 No wintering geese were recorded in the Quadrats. In terms of other key species, eight bullfinch (JNCC Red List, UK BAP and LBAP status) were recorded in Quadrat SL-Wb04.

December 2006

3.3.7 No wintering geese were recorded, however 128 fieldfare (WCA1i and JNCC Amber List status) were recorded in Quadrat SL-Wb06, five crossbill (WCA1i status) were recorded in Quadrat SL-Wb05 and 80 lapwing (JNCC Amber List status) were recorded in Quadrat SL-Wb05.

January 2007

3.3.8 Pink-footed geese (JNCC Amber List status) were recorded in Quadrat SL-Wb11 (maximum count of 300), 25 greylag geese (JNCC Amber List status) were recorded in Quadrat SL-Wb11, 150 redwing (WCA1i and JNCC Amber List status) were recorded in Quadrat SL-Wb11, 50 fieldfare (WCA1i and JNCC Amber List status) were recorded in Quadrat SL-Wb09 and seven twite (JNCC Red List, LBAP and locally rare/uncommon status) were recorded in Quadrat SL-Wb12.

February 2007

3.3.9 Pink-footed geese (JNCC Amber List status) were recorded in Quadrat SL-Wb07 (maximum count 80), 17 greylag geese (JNCC Amber List status) were recorded in Quadrat SL-Wb06, 100 redwing (WCA1i and JNCC Amber List status) recorded in Quadrat SL-Wb05 and 60 fieldfare (WCA1i and JNCC Amber List status) were recorded in Quadrat SL-Wb04.

3.4 Habitat Descriptions: WOVs and Quadrats

3.4.1 The following section presents a description of the habitats represented within each WOV and Quadrat.

Section SL1

3.4.2 Section SL1 is characterised by improved grassland fields with some less intensively managed semi-improved fields together with pockets of marshy grassland and scrub. An extensive contiguous area of conifer plantation woodland, comprising Duff's Hill and Blue Hill, is present at the eastern end of the section. A small remnant area of wet modified bog is located west of Quadrat SL-Wb02 and south of the Blue Hill. A number of discrete stands of mature Scots pine are also present throughout the section. Table 10 presents a detailed description of habitats present within each WOV and Quadrat.

Table 10 - Habitat Descriptions for Section SL1

WOV / Quadrat	Representative Habitat Areas	Value	Habitat Description
Loirston Loch	N.A.	High	A moderate sized waterbody which lies adjacent and east of S1. Surrounded by improved grassland, fields and pockets of woodland.
SL-Wb01	S2 S5	Low	Large fields of improved, semi-improved (acid) grassland with areas of scattered scrub and marsh / marsh grassland around a pond at Gallowhill. An area of bare ground with a boundary of parkland / scattered trees is present in the north-west of the Quadrat.
SL-Wb02	S2	Low	Fields of improved and poor semi-improved grassland boarded by stone walls with occasional patches of scattered scrub. Areas of semi-improved grassland with lines of parkland / scattered trees are present adjacent to the A90 and A956. Two small fields of marsh / marshy grassland and semi-improved acid grassland are located immediately south of the A956. Isolated stands of mixed plantation woodland are present in fragments of land at the A90/A956 junction.
SL-Wb03	S6 S7 S9	Medium	Conifer plantation woodland with some neutral semi-improved grassland along rides and pockets of broad-leaved plantation woodland. Other habitats within the Quadrat comprise improved fields and small areas of marshy grassland.
SL-Wb04	S10 S13	Medium	Largely improved grassland. An area of wet modified bog associated with Hare Moss lies in the North East adjacent to a small area of semi-natural broadleaved woodland; some standard broadleaved trees occur within the bog.

Section SL2

3.4.3 Section SL2 is characterised by improved agricultural grassland fields separated by stonewalls with patches of dense and scattered scrub (that become extensive in places) and occasional species rich hedgerow. Extensive areas of conifer plantation woodland, comprising Clochandighter Wood and Hill of Blairs, are present in the southeast and northwest of the section together with areas of semi-natural / plantation broad-leaved woodland at Greenloaning and Heatherknowe in the north-east. Table 11 presents a detailed description of habitats present within each Quadrat.

Table 11 – Habitat Descriptions for Section SL2

WOV / Quadrat	Representative Habitat Areas	Value	Habitat Description
SL-Wb05	S13	Medium	Largely semi-improved grassland which encompass 2 small areas of conifer plantation. In addition, patches of dense scrub are located throughout the Quadrat.
SL-Wb06	S15 S16 S17 S20	Medium	Predominantly improved grassland and arable fields, with soft riush (*Juncus effusus)* abundant in a wetter area in the south. A small shelterbelt of mixed plantation woodland is located in the south. Areas of conifer plantation are located in the north.

Section SL3

3.4.4 Section SL3 is characterised by extensive areas of conifer/mixed plantation and semi-natural broad-leaved woodland with large areas of parkland and scattered trees and amenity grassland (represented by Cleanhill Wood and Kingcausie). This Section also comprises improved, and to a lesser degree poor semi-improved/semi-improved agricultural grassland fields, many of which are separated by dry stone walls with occasional areas of dense and scattered scrub confined to the south and west of the section. The north of the section is dominated by the River Dee and its tributaries (Crynoch Burn/Blaikiewell Burn) with extensive areas of semi-natural broad-leaved woodland (to the south of the river) and semi-improved grassland (to the north of the river).Table 12 presents a detailed description of habitats present within each Quadrat.

Table 12 – Habitat Descriptions for Section SL3

WOV / Quadrat	Representative Habitat Areas	Value	Habitat Description
SL-Wb07	S21 - 23	High	Predominantly arable and semi improved grassland, but also includes areas of broad leaved woodland, mixed plantation and a small area of acid heath.

Section SL4

3.4.5 Section SL4 is characterised by residential housing (some with mature established gardens), large sports complexes, schools, nursing homes and hotels in the south of the section. Remaining habitats north of Milltimber comprise improved grassland and occasional arable fields separated by dry stone walls with tree-lines and scattered scrub along field margins. Areas of broad-leaved and coniferous plantation woodland with pockets of semi-natural broad-leaved woodland are also present. A large area of wet heath/acid grassland and coniferous plantation woodland (Beanshill) is located in the north of the section. Table 13 presents a detailed description of habitats present within each Quadrat.

Table 13 – Habitat Descriptions for Section SL4

WOV / Quadrat	Represented Habitat Areas	Value	Habitat Description
SL-Wb08	S29 - 33	Medium	Partially occurs within Deeside Old Railway DWS. Improved grassland and arable fields and built up areas associated with Peterculter. The Quadrat additionally includes some broad-leaved woodland and part of a golf course comprising amenity grassland and parkland / scattered trees.
SL-Wb09	S36 S37	Medium	Improved grassland with some arable land. There is a significant amount of scrub along field and road edges and a small block of broad-leaved woodland.

Section SL5

3.4.6 Section SL5 is characterised by improved grassland with occasional arable fields, scattered clumps and boundary lines of scrub and conifer plantation. There are numerous small burns and drains through this area. Table 14 presents a detailed description of habitats.

Table 14 - Habitat Descriptions for Section SL5

WOV / Quadrat	Represented Habitat Areas	Value	Habitat Description
Quadrat SL-Wb10	S40 S43	Medium	Improved grassland which is bisected by a number of small burns. In addition, a small area of fen is located in the centre of the Quadrat.
Quadrat SL-Wb11	S44 S45	High	The south-west of quadrat occurs within an area of broad leaved woodland associated with Moss of Auchlea DWS. Remaining habitats outside the DWS are for the most part comprised of improved grassland. However, a section of Kingshill Wood lies in the east, which contains a network of small burns.

Section SL6

3.4.7 Section SL6 is characterised by fields of improved and poor semi-improved grassland with tree / scrub lined stonewall boundaries and areas of dense and scattered scrub. A mixed shelterbelt plantation with an area of unimproved grassland and scattered trees additionally occur on Cloghill. Table 15 presents a detailed description of habitats.

Table 15 – Habitat Descriptions for Section SL6

WOV / Quadrat	Represented Habitat Areas	Value	Habitat Description
Quadrat SL-Wb12	S46 S48	Medium	Quadrat SQL partly occurs within west Hatton Wood DWS. The remaining habitats within the Quadrat comprise predominantly improved fields and unimproved neutral grassland/acid grassland in the west. Semi-improved grassland with scattered trees and scrub and a small area of broadleaf woodland are located immediately adjacent to Kingswells.

Consultation

3.4.8 Consultation with SNH and the RSPB did not identify the presence of any bird nature reserves or provide any previous records of key wintering bird species within or adjacent to the proposed scheme study area.

3.4.9 Loirston Loch was identified as a DWS by Aberdeen City Council / NESBReC as it supports important numbers of wintering wildfowl.

3.4.10 Records of wintering bird species along the route corridor was obtained from the BTO and WWT in 2005; and from the North-East Scotland Bird Report (2005). These identified Loirston Loch as being of importance for over-wintering populations of grey geese, principally greylag and pink-footed geese.

Incidental Observations

3.4.11 Four key species were recorded within the route corridor outwith the WOV/Quadrats of which:

- two were EU Birds Directive Annex 1 species (greylag goose and pink-foot goose); and
- four were Amber List species (greylag goose, pink-footed goose, curlew and lapwing).

Survey Results

3.4.12 Wintering bird surveys were undertaken at a single WOV (Loirston Loch) and at 12 Quadrats established along or adjacent to the route corridor. At Loirston Loch, a total of 27 wintering geese, waders, wildfowl and bird species of conservation concern were recorded, of which:

- one was EU Birds Directive Annex 1 species (kingfisher);
- two were WCA1i species (barn owl and kingfisher);
- one was a JNCC Red List species (reed bunting); and
- 14 were JNCC Amber List species (barn owl, black-headed gull, common gull, cormorant, greylag goose, herring gull, kingfisher, lapwing, mute swan, oystercatcher, teal, wigeon, pochard and pink-footed goose).

3.4.13 A total of 62 wintering bird species were recorded throughout the 12 Quadrats of which:

- three are WCA1i (crossbill, fieldfare and redwing);
- 12 are JNCC Red List species (skylark, bullfinch, song thrush, starling, house sparrow, tree sparrow, yellowhammer, reed bunting, grey partridge, linnet and twite); and
- 22 species are JNCC Amber List species (black-headed gull, common gull, curlew, dunnock fieldfare, goldcrest, grey wagtail, greylag goose, herring gull, kestrel, lapwing, meadow pipit, mistle thrush, oystercatcher, pink-footed goose, redwing, snipe, stock dove, stonechat, teal, wigeon and woodcock.

3.4.14 Pink-footed geese and greylag geese (identified in this report as species of conservation importance) were recorded in six (SL-Wb01, SL-Wb03, SL-Wb04, SL-Wb05, SL-Wb07 and SLWb11) and three Quadrats of the 12 Quadrats (SL-Wb05, SL-Wb06 and SL-Wb11) respectively.

Habitat Description

3.4.15 The majority of the study area comprises farmland of improved/poor semi-improved grassland and arable (with the exception of north of Kingswells) which support areas of dense and scattered scrub frequently located along field boundaries together with parkland/scattered trees. Hedgerows are uncommon in particular species rich hedgerows.

3.4.16 A number of watercourses are present within the route corridor, of note, the River Dee and Crynoch Burn (which are part of the River Dee SAC).

4 Evaluation

4.1 Introduction

4.1.1 The ecological value of Quadrats and Habitat Areas for wintering birds was determined by considering the habitat evaluation of each area combined with the value of the wintering bird assemblage present. The ecological value of remaining ecological habitat areas in each route section was determined by an initial evaluation of habitat potential for wintering birds combined with the knowledge of the wintering bird assemblages found in adjacent representative WOVs or Quadrats.

4.2 Evaluation of WOVs and Quadrats

4.2.1 Table 16 provides a list of key bird species recorded within each WOV and Quadrat. Where a key bird species was recorded only as an incidental sighting (noted in Table 5), it has been assigned to the appropriate Quadrat or WOV and marked with an asterisk. Incidental sightings without grid references have not been included in the evaluation below, as the information could not be identified with a particular WOV or Quadrat.

Section SL1

4.2.2 Loirston Loch WOV and four Quadrats (SL-Wb01 – SL-Wb04) are located within Section SL1 and are evaluated below.

Loirston Loch WOV

4.2.3 The wintering bird assemblage recorded at Loirston Loch WOV is considered to be of a high diversity. Twenty-seven wintering bird species were recorded, of which one was an EU Birds Directive Annex 1 species (kingfisher), two were WCA1i species (barn owl, kingfisher), one was a JNCC Red List species (reed bunting), 14 were JNCC Amber List species (barn owl, black-headed gull, common gull, cormorant, greylag goose, herring gull, kingfisher, lapwing, mute swan, oystercatcher, teal, wigeon, pochard, pink-footed goose), two were UK BAP species (cormorant, reed bunting), six were LBAP species (kingfisher, goldeneye, reed bunting, snipe, barn owl, linnet) and two were of locally rare/uncommon species status (barn owl, kingfisher). The habitats that comprise the habitat areas within the WOV are assessed as being of high value for birds, comprising a moderate sized water body surrounded by improved grassland, fields and pockets of woodland.

4.2.4 Of the other species recorded within or adjacent to the WOV, the most important were the large assemblages of pink-footed and greylag geese that were recorded mainly between February and March 2005 and between January and February 2007.with smaller numbers occurring in the earlier months.

4.2.5 Due to the grey geese assemblages (a maximum count of 2550 pink-footed geese representing 0.9% of the UK population) and a maximum count of 5000 greylag geese (representing 6% of the UK population) recorded roosting on Loirston Loch) Loirston Loch WOV is assessed as being of national conservation value for wintering birds.

4.2.6 The wintering bird assemblage recorded in Quadrat SL-Wb01 is considered to be of medium diversity, with 24 wintering bird species of which none were EU Birds Directive Annex 1 species, one was a WCA1i species (fieldfare), three were JNCC Red List species (reed bunting, song thrush, starling), ten were JNCC Amber List species (dunnock, meadow pipit, herring gull, teal, fieldfare, pink-footed goose, curlew, lapwing, snipe, wigeon), two were UK BAP species (song

thrush, reed bunting), five were LBAP species (reed bunting, song thrush, curlew, snipe, lapwing) and none were of a locally rare/uncommon species status. The habitats are assessed as being of low value for birds, comprising large fields of improved, semi-improved acid grassland, scattered scrub, marsh/marshy grassland, a pond, bare ground, parkland and scattered trees (refer to Table 10). The wintering assemblage found in Quadrat SL-Wb01 is considered to enrich the biodiversity resource within the local context and therefore is considered to be of local ecological value.

4.2.7 The wintering bird assemblage recorded in Quadrat SL-Wb02 is considered to be of a medium diversity, with 23 wintering bird species of which none were EU Birds Directive Annex 1 species, none were WCA1i species, three were JNCC Red List species (skylark, starling, house sparrow), seven were JNCC Amber List species (meadow pipit, stonechat, kestrel, snipe, common gull, black-headed gull, herring gull), one was a UK BAP species (skylark), three were LBAP species (skylark, snipe, kestrel) and none were of a locally rare/uncommon species status. The habitats are assessed as being of low value for birds, comprising fields of improved, poor semi-improved-semi-improved acid grassland, scattered scrub, marsh/marshy grassland, parkland, scattered trees and plantation woodland fragments. The wintering assemblage found in Quadrat SL-Wb02 is considered to enrich the biodiversity resource within a local context and therefore is considered to be of local ecological value.

4.2.8 The wintering bird assemblage recorded in Quadrat SL-Wb03 is considered to be of a medium diversity, with 24 wintering bird species of which none were EU Birds Directive Annex 1 species, one was a WCA1i species (fieldfare), one was a JNCC Red List species (skylark), ten were JNCC Amber List species (dunnock, goldcrest, meadow pipit, common gull, fieldfare, kestrel, snipe, mistle thrush, stock dove, pink-footed goose), one was a UK BAP species (skylark), three were LBAP species (skylark, kestrel, snipe) and none were of a locally rare/uncommon species status. The habitats are assessed as being of medium value for birds, comprising conifer plantation woodland, neutral semi-improved grassland, broad-leaved plantation woodland, improved grassland and marshy grassland. The wintering assemblage found in Quadrat SL-Wb03 is considered to enrich the biodiversity resource within the local context and therefore is considered to be of local ecological value.

4.2.9 The wintering bird assemblage recorded in Quadrat SL-Wb04 is considered to be of a medium diversity, with 28 wintering bird species of which none were EU Birds Directive Annex 1 species, two were WCA1i species (redwing, fieldfare), two were JNCC Red List species (starling, bullfinch), 12 were JNCC Amber List species (curlew, dunnock, lapwing, meadow pipit, snipe, common gull, herring gull, kestrel, woodcock, redwing, fieldfare, pink-footed goose), one was UK BAP species (bullfinch,), four were LBAP species (curlew, kestrel, bullfinch, snipe) and none were local status species. The habitats are assessed as being of medium value for birds, comprising improved grassland, wet modified bog, semi-natural broad-leaved woodland and occasional standard broad-leaved trees. The wintering assemblage found in Quadrat SL-Wb04 is considered to enrich the biodiversity resource within the county context and therefore is considered to be of county ecological value.

Section SL2

4.2.10 Two Quadrats (SL-Wb05 – SL-Wb06) are located within Section SL2 and are evaluated below.

4.2.11 The wintering bird assemblage recorded in Quadrat SL-Wb05 is considered to be of a medium diversity, with 28 wintering bird species of which none were EU Birds Directive Annex 1 species, two were WCA1i species (redwing, crossbill), four were JNCC Red List species (house sparrow, linnet, song thrush, starling), ten were JNCC Amber List species (dunnock, pink-footed goose, mistle thrush, common gull, meadow pipit, greylag goose, snipe, stock dove, fieldfare, goldcrest), two were UK BAP species (linnet, song thrush), three were LBAP species (linnet, song thrush, snipe), and none were locally rare/uncommon species status. The habitats are assessed as being of medium value for birds, comprising semi-improved grassland, coniferous plantation and dense scrub (refer to Table 11). The wintering bird assemblage found in Quadrat SL-Wb05 is considered to enrich the biodiversity resource within the county context and therefore is considered to be of county ecological value.

4.2.12 The wintering bird assemblage recorded in Quadrat SL-Wb06 is considered to be of a medium diversity, with 27 wintering bird species of which none were EU Birds Directive Annex 1 species, one was a WCA1i species (fieldfare), three were JNCC Red List species (house sparrow, reed bunting, starling), eight were JNCC Amber List species (dunnock, goldcrest, mistle thrush, fieldfare, meadow pipit, stonechat, greylag goose, pink-footed goose), one was a UK BAP species (reed bunting), one was an LBAP species (reed bunting) and none were locally rare/uncommon species status. The habitats are assessed as being of medium value for birds, comprising improved grassland, arable fields, mixed plantation woodland and coniferous plantation woodland. The wintering assemblage found in Quadrat SL-Wb06 is considered to enrich the biodiversity resource within the county context and therefore is considered to be of county ecological value.

Section SL3

4.2.13 One Quadrat (SL-Wb07) is located within Section SL3 and is evaluated below.

4.2.14 The wintering bird assemblage recorded in Quadrat SL-Wb07 is considered to be of a medium diversity, with 25 wintering bird species of which none were EU Birds Directive Annex 1 species, one was a WCA1i species (redwing), three were JNCC Red List species (bullfinch, song thrush, grey partridge), seven were JNCC Amber List species (curlew, dunnock, goldcrest, pink-footed goose, mistle thrush, common gull, redwing), three were UK BAP species (bullfinch, grey partridge, song thrush), four were LBAP species (curlew, bullfinch, song thrush, grey partridge) and none were locally rare/uncommon species status. The habitats are assessed as being of high value for birds, comprising improved grassland, amenity grassland, mixed plantation woodland, ponds, and watercourses Table 12). The wintering assemblage found in Quadrat SL-Wb07 is considered to enrich the biodiversity resource within the county context and therefore is considered to be of county ecological value.

Section SL4

4.2.15 Two Quadrats (SL-Wb08 – SL-Wb09) are located within Section SL4 and are evaluated below.

4.2.16 The wintering bird assemblage recorded in Quadrat SL-Wb08 is considered to be of a medium diversity, with 26 wintering bird species of which none were EU Birds Directive Annex 1 species, one was a WCA1i species (fieldfare), two were JNCC Red List species (song thrush, bullfinch), eight were JNCC Amber List species (black-headed gull, herring gull, goldcrest, meadow pipit, dunnock, grey wagtail, mistle thrush, fieldfare), two were UK BAP species (song thrush, bullfinch), two were LBAP species (song thrush, bullfinch) and none were locally rare/uncommon species status. The habitats are assessed as being of medium value for birds, comprising improved grassland, arable fields, broad-leaved woodland, scattered standard trees, amenity grassland/parkland and buildings/hardstanding. The wintering assemblage found in Quadrat SL-Wb08 is considered to enrich the biodiversity resource within the local context and therefore is considered to be of local ecological value.

4.2.17 The wintering bird assemblage recorded in Quadrat SL-Wb09 is considered to be of a medium diversity, with 27 wintering bird species of which none were EU Birds Directive Annex 1 species, one was a WCA1i species (fieldfare), five were JNCC Red List species (house sparrow, song thrush, starling, yellowhammer, skylark), eight were JNCC Amber List species (meadow pipit, herring gull, black-headed gull, goldcrest, fieldfare, oystercatcher, dunnock, woodcock), two were UK BAP species (song thrush, skylark), three were LBAP species (yellowhammer, song thrush, skylark) and none were of a locally rare/uncommon species status. The habitats are assessed as being of medium value for birds, comprising arable farmland, improved grassland, scrub and a small area of broad-leaved woodland (Table 13). The wintering assemblage found in Quadrat SL-Wb09 is considered to enrich the biodiversity resource within the county context and therefore is considered to be of county ecological value.

Section SL5

4.2.18 Two Quadrats (SL-Wb010 – SL-Wb11) are located within Section SL5 and are evaluated below.

4.2.19 The wintering bird assemblage recorded in Quadrat SL-Wb10 is considered to be of a medium diversity, with 27 wintering bird species of which none were EU Birds Directive Annex 1 species, none were WCA1i species, two were JNCC Red List species (bullfinch, song thrush), eight were JNCC Amber List species (common gull, meadow pipit, mistle thrush, herring gull, snipe, woodcock, stonechat, dunnock), two were UK BAP species (song thrush, bullfinch), three were LBAP species (bullfinch, song thrush, snipe) and none were of a locally rare/uncommon species status. The habitats are assessed as being of medium value for birds, comprising improved grassland, a number of burns and a small area of fen (Table 14). The wintering assemblage found in Quadrat SL-Wb10 is considered to enrich the biodiversity resource within the local context and therefore is considered to be of local ecological value.

4.2.20 The wintering bird assemblage recorded in Quadrat SL-Wb11 is considered to be of a medium diversity, with 29 wintering bird species of which none were EU Birds Directive Annex 1 species, one was a WCA1i species (redwing), five were JNCC Red List species (skylark, song thrush, bullfinch, starling, grey partridge), eight were JNCC Amber List species (common gull, pink-footed goose, dunnock, meadow pipit, goldcrest, greylag goose, redwing, mistle thrush), four were UK BAP species (bullfinch, grey partridge, skylark, song thrush), five were LBAP species (skylark, song thrush, bullfinch grey partridge) The habitats are assessed as being of high value for birds, comprising broad-leaved woodland, improved grassland and several small burns. The wintering assemblage found in Quadrat SL-Wb11 is considered to enrich the biodiversity resource within the county context and therefore is considered to be of county ecological value.

Section SL6

4.2.21 One Quadrat (SL-Wb12) is located within Section SL6 and is evaluated below.

4.2.22 The wintering bird assemblage recorded in Quadrat SL-Wb12 is considered to be of a high diversity, with 33 breeding bird species of which none were EU Birds Directive Annex 1 species, two were WCA1i species (redwing, fieldfare), two were JNCC Red List species (linnet, twite), eleven were JNCC Amber List species (dunnock, herring gull, stock dove, kestrel, mistle thrush, stonechat, common gull, redwing, fieldfare, goldcrest, pink-footed goose), one was a UK BAP species (linnet), four were LBAP species (kestrel, twite, linnet) and one was of a locally rare/uncommon species status (twite). The habitats are assessed as being of medium value for birds, comprising a mixture of unimproved neutral, semi-improved, improved and acid grassland, scattered standard trees, scrub and a small area of broad-leaved woodland (Table 15). The wintering assemblage found in Quadrat SL-Wb12 is considered to enrich the biodiversity resource within the county context and therefore is considered to be of county ecological value.

Table 16 – Evaluation of Bird Species of Conservation Concern: WOV and Quadrats Wb1-12

Quadrat	Habitat Area Contributing to the Value of the Quadrat	Value of Habitats for Wintering Birds	Total Number of Wintering Bird Species Recorded in Quadrat	Legal / Conservation Status of Key Bird Species (Wintering and Incidentals)							Value of Wintering Bird Assemblage
				EU Birds Directive Annex I	WCA1i	JNCC Red List	JNCC Amber List	UK BAP	LBAP	Local Status (Uncommon / Rare)	
Section SL1											
Loirston Loch											
Loirston Loch (WOV)	N.A.	High	23	kingfisher	barn owl kingfisher	reed bunting	barn owl black-headed gull common gull cormorant greylag goose herring gull kingfisher lapwing mute swan oystercatcher teal wigeon pochard pink-footed goose	cormorant reed bunting	kingfisher goldeneye snipe barn owl lapwing reed bunting	barn owl kingfisher	National
Quadrat SL-Wb01 West of Wellington Loch	S2 S5	Low	24		fieldfare	reed bunting starling song thrush	teal dunnock fieldfare herring gull meadow pipit pink-footed goose curlew lapwing snipe wigeon	song thrush reed bunting	curlew snipe reed bunting song thrush lapwing		Local

Quadrat	Habitat Area Contributing to the Value of the Quadrat	Value of Habitats for Wintering Birds	Total Number of Wintering Bird Species Recorded in Quadrat	Legal / Conservation Status of Key Bird Species (Wintering and Incidentals)							Value of Wintering Bird Assemblage
				EU Birds Directive Annex I	WCA1i	JNCC Red List	JNCC Amber List	UK BAP	LBAP	Local Status (Uncommon / Rare)	
Section SL1											
Quadrat SL-Wb02 Charleston Junction	S2	Low	23			starling house sparrow skylark	stonechat meadow pipit kestrel snipe common gull black-headed gull herring gull	skylark	kestrel skylark snipe		Local
Quadrat SL-Wb03 Greenhowe Woods	S6 S7 S9	Medium	24		fieldfare	skylark	goldcrest meadow pipit fieldfare kestrel snipe mistle thrush stock dove pink-footed goose* dunnock common gull	skylark	snipe kestrel skylark		Local
Quadrat SL-Wb04 North of Hare Moss	S10 S13	Medium	28		redwing fieldfare	starling bullfinch	dunnock common gull herring gull kestrel meadow pipit snipe curlew* woodcock lapwing* redwing fieldfare pink-footed goose*	bullfinch	kestrel curlew snipe bullfinch lapwing		County

Quadrat	Habitat Area Contributing to the Value of the Quadrat	Value of Habitats for Wintering Birds	Total Number of Wintering Bird Species Recorded in Quadrat	Legal / Conservation Status of Key Bird Species (Wintering and Incidentals)							Value of Wintering Bird Assemblage
				EU Birds Directive Annex I	WCA1i	JNCC Red List	JNCC Amber List	UK BAP	LBAP	Local Status (Uncommon / Rare)	
Section SL1											
Section SL2											
Quadrat SL-Wb05 Merchants Croft	S13	Medium	28		fieldfare crossbill	house sparrow linnet starling song thrush	pink-footed goose mistle thrush common gull meadow pipit dunnock greylag goose snipe stock dove fieldfare goldcrest	linnet song thrush	snipe linnet song thrush		County
Quadrat SL-Wb06 Cleanhill Wood and Blaikiewell Burn	S15 S16 S17 S20	Medium	27		fieldfare	house sparrow starling reed bunting	dunnock goldcrest mistle thrush fieldfare meadow pipit stonechat greylag goose* pink-footed goose*	reed bunting	reed bunting		County
Section SL3											
Quadrat SL-Wb07 Crynoch Burn	S21 S22 S23	High	25		redwing	bullfinch song thrush grey partridge	curlew dunnock goldcrest pink-footed goose* mistle thrush common gull redwing	bullfinch grey partridge song thrush	curlew bullfinch grey partridge song thrush		County

Quadrat	Habitat Area Contributing to the Value of the Quadrat	Value of Habitats for Wintering Birds	Total Number of Wintering Bird Species Recorded in Quadrat	Legal / Conservation Status of Key Bird Species (Wintering and Incidentals)							Value of Wintering Bird Assemblage
				EU Birds Directive Annex I	WCA1i	JNCC Red List	JNCC Amber List	UK BAP	LBAP	Local Status (Uncommon / Rare)	
Section SL1											
Section SL4											
Quadrat SL-Wb08 South of Milltimber	S29 S30 S31 S32 S33	Medium	26		fieldfare	song thrush bullfinch	black-headed gull herring gull goldcrest meadow pipit dunnock grey wagtail mistle thrush fieldfare	song thrush bullfinch	song thrush bullfinch		Local
Quadrat SL-Wb09 North of A93 (Milltimber Junction)	S36 S37	Medium	28		fieldfare	house sparrow song thrush starling yellowhammer skylark	meadow pipit herring gull black-headed gull goldcrest fieldfare oystercatcher dunnock woodcock	song thrush skylark	yellowhammer song thrush skylark		County
Section SL5											
Quadrat SL-Wb10 South of Silverburn	S40 S43	Medium	27			bullfinch song thrush	common gull meadow pipit mistle thrush herring gull snipe woodcock stonechat dunnock	bullfinch song thrush	bullfinch song thrush snipe		Local

Quadrat	Habitat Area Contributing to the Value of the Quadrat	Value of Habitats for Wintering Birds	Total Number of Wintering Bird Species Recorded in Quadrat	Legal / Conservation Status of Key Bird Species (Wintering and Incidentals)							Value of Wintering Bird Assemblage
				EU Birds Directive Annex I	WCA1i	JNCC Red List	JNCC Amber List	UK BAP	LBAP	Local Status (Uncommon / Rare)	
Section SL1											
Quadrat SL-Wb11 North of Auchlea Moss	S44 S45	High	29		redwing	skylark song thrush bullfinch starling grey partridge	common gull pink-footed goose dunnock meadow pipit goldcrest greylag goose redwing mistle thrush	skylark song thrush bullfinch grey partridge	skylark song thrush bullfinch grey partridge		County
Section SL6											
Quadrat SL-Wb12 South of Cloghill	S46 S48	Medium	33		redwing fieldfare	linnet twite	dunnock herring gull stock dove kestrel mistle thrush stonechat common gull redwing fieldfare goldcrest pink-footed goose*	linnet	kestrel twite linnet	twite	County

* indicates incidental recording.

4.3 Evaluation of Habitat Areas

Section SL1

4.3.1 An evaluation of Habitat Areas within Section SL1 is presented in Table 17.

Table 17 – Evaluation of Habitat Areas for Section SL1

Habitat Area	Habitat Value	Habitat Description	Value of Wintering Bird Assemblage
S1	Low	Birch wood, which, although derived from plantation, is beginning to develop a semi-natural ground flora.	S1 was not sampled by a Quadrat but it is considered to be of a similar habitat composition to Quadrat SL-Wb11 although slightly less diverse. Accordingly it is likely to support a similar but less diverse wintering bird assemblage. Local
S2	Low	A series of largely improved fields, many of which are separated by dry stone walls.	Habitats within S2 were partially sampled by Quadrats SL-Wb01 and SL-Wb2 which are considered to be representative of S2. Therefore it is likely to support a similar wintering bird assemblage. Local
S3	Local	A mosaic of habitats comprising coniferous plantation woodland, mature deciduous and mixed parkland / scattered trees, dense scrub, semi-improved neutral grassland and continuous bracken.	S3 was not sampled by a Quadrat. However, it is considered to be of a similar composition to those represented by Quadrat SL-Wb03 therefore S3 is likely to support a similar wintering bird assemblage. Local
S4	Medium	Small area of modified degraded bog habitats. The west is slightly drier than the east due to a slope, thereby resulting in different bog communities, for example, ericoids are more extensive in the west.	Habitats within S4 were not sampled by a Quadrat. However, S4 is composed of similar habitats to Quadrat SL-Wb04 although S4 is smaller in size and degraded in terms of habitats and is therefore less likely to support a diverse assemblage as Quadrat SL-Wb04. Local
S5	Medium	Dominated by large arable and improved fields, this area also contains drain-associated marshy grassland with influence of bog species. A woody element is provided by conifers to the south of un-named farm buildings.	Habitats within S5 were partially sampled by Quadrat SL-Wb01 which is considered to be representative of S5 and therefore it is likely to support a similar wintering bird assemblage. Local
S6	Medium	Young coniferous plantation with broadleaved edges and occasional blocks. A species poor semi-improved ground flora is limited to these broadleaved sections. A patch of marsh is present to the west, whilst a pond with surrounding wet grassland is located in the northwest.	Habitats within S6 were partially sampled by Quadrat SL-Wb03 which is considered to be representative of S6 and therefore S6 is likely to support a similar wintering bird assemblage. County
S7	Low	Dense pine plantation with broadleaved edge and a strip of scrub, however, virtually no ground flora is associated with this forest.	Habitats within S7 were partially sampled by Quadrat SL-Wb03. However, S7 is less diverse owing to a greater coverage of woodland and is therefore likely to support a less diverse wintering bird assemblage. Local

Habitat Area	Habitat Value	Habitat Description	Value of Wintering Bird Assemblage
S8	Medium	Series of improved, poor semi-improved and arable fields. Walls are present though limited, whilst shrubs are extremely sparse.	Habitats within S8 were partially sampled by Quadrat SL-Wb02 and are similar to those represented by Quadrat SL-Wb03, which are considered to be representative of S8 and therefore is likely to support a similar assemblage of wintering birds. Local
S9	Low	The majority of this area is composed of young spruce plantation with little ground flora. Other habitats present include amenity grassland with scattered trees and more mature conifer plantation with poor to good semi-improved field flora. To the south, semi-improved acid grassland with scrub gives way to a small semi-natural broadleaved woodland.	Habitats within S9 were not sampled by Quadrat. However, the habitats within S9 are similar to habitats represented by part of Quadrat SL-Wb03. This is considered to be representative of S9 and therefore is likely to support a similar wintering bird assemblage. Local
S10	High	A mosaic of woodland and remnant heathland/bog habitats, comprising wet modified bog and semi-natural broad-leaved woodland with areas of deciduous parkland / scattered trees and scattered and dense scrub. Two small areas of marsh / marshy grassland are located in the west of the habitat area with an area of standing water (bog pool).	Habitats within S10 were partially sampled by Quadrat SL-Wb04, which is considered to be representative of S10 and therefore the area is likely to support a similar assemblage of wintering birds. County

Section SL2

4.3.2 An evaluation of Habitat Areas within Section SL2 is presented in Table 18.

Table 18 – Evaluation of Habitat Areas for Section SL2

Habitat Areas	Habitat Value	Description	Value of Wintering Bird Assemblage
S11	Medium	Habitats comprise a small block of scrubby broad-leaved plantation woodland. Occasional conifers are present but mostly confined to the western end of the habitat area. The ground layer is dominated by ericaceous species and bracken.	Habitats within S11 were not sampled by a Quadrat. However, the habitats within S11 are similar although less diverse to habitats represented by Quadrat SL-Wb04 and therefore this area is likely to support a similar but less diverse wintering assemblage. Local
S12	Medium	Two distinct areas of woodland. To the east is a dense birch woodland plantation with other occasional broadleaved shrubs. The east is dominated by a semi-natural mix of broadleaves though birch is dominant. Pools, burns and channels are present in both woods.	Habitats within S12 were not sampled by a Quadrat. However, the habitats are similar although less diverse to habitats occurring within Quadrat SL-Wb07 and therefore this area is likely to support a similar but less diverse wintering bird assemblage. Local

Habitat Areas	Habitat Value	Description	Value of Wintering Bird Assemblage
S13	Medium	A series of improved and horse-grazed semi-improved fields. Small copses of broadleaves surrounded by walls are present though the ground flora is species poor.	Habitats within S13 were sampled by Quadrats SL-Wb04 and SLWb-05. These are considered to be representative of S13 and therefore likely to support a similar assemblage of wintering birds. County
S14	Low	Mature conifer plantation woodland. A sizeable portion of this area has been felled, with the remaining portion being dominated by lodgepole pine and spruce. Dry heath dominates the rides and is also present under much of the plantation. A concrete water storage system is at the centre of this area.	Habitats within S14 were not surveyed a Quadrat. However, the habitats within S14 are similar to habitats represented Quadrat SL-Wb03 but the habitat mosaic within S14 is less diverse and therefore is less likely to support as diverse a wintering assemblage. Local
S15	Medium	Broad-leafed and coniferous plantation lies to the West of this area, while the East is comprised of a mixture of dense scrub, acid heath/acid grassland mosaic which encompasses a small area of fen.	Habitats within S15 were partially sampled by Quadrat SL-Wb06 although S15 is more densely forested. Therefore it is likely to support a similar but less diverse wintering assemblage. Local
S16	Medium	Improved grassland dominates this area. Soft rush dominated marshy grassland is present within the field. Trees and hedgerows are present within some of the fields and surrounding the area, as are dry stone walls.	Habitats within S16 were partially sampled by Quadrat SL-Wb06. However, the S16 is more open and considered to be of greater suitablility for wintering grey geese. Although not considered to be fully representative, the Habitat Area is similar in composition and therefore is likely to support a similar wintering assemblage. County

Section SL3

4.3.3 An evaluation of Habitat Areas within Section SL3 is presented in Table 19.

Table 19 – Evaluation of Habitat Areas for Section SL3

Habitat Area	Habitat Value	Habitat Description	Value of Wintering Bird Assemblage
S17	Medium	Dominated by improved fields with a small area of species poor marshy grassland. Separating these fields is an avenue of long established broad-leaved trees with ancient woodland indicator species.	Habitats within S17 were partially sampled by Quadrat SL-Wb06, while the remainder are of a similar composition to SL-Wb01. Therefore, S17 is likely to support a similar wintering bird assemblages to those recorded in the Quadrats. County
S18	Low	Large expanse of plantation woodland, both of broad-leaved and conifer habitat. The conifers are mature and have little ground flora associated with them, whilst the broadleaved birch dominated wood is relatively young and planted upon marshy and acid grassland. Dry heath is often associated with the paths through the wood.	Habitats within S18 were not sampled by a Quadrat. However the habitats are similar in composition to the habitat mosaic represented by Quadrats SL-Wb03 and SL-Wb06 although more densely wooded. Therefore S18 is likely to support a similar but less diverse wintering assemblage. Local

Habitat Area	Habitat Value	Habitat Description	Value of Wintering Bird Assemblage
S19	Medium	Sequence of horse-grazed semi-improved fields with occasional buildings. The fields rise sharply from Blaikiewell Burn (i.e. not part of the flood plain) but are gently sloping thereafter towards the south. The rides are lined with shrubs approaching hedgerows. An arable field is also present.	Habitats within S19 were not sampled by a Quadrat. However, they are considered to be similar to Quadrat SL-Wb02. Therefore S19 is likely to support a similar wintering assemblage. Local
S20	Medium	Comprises a mature conifer plantation woodland that contains significant amounts of semi-natural broadleaved woodland. The ground flora is very variable, ranging from heath, acid grassland to bare soil. Rhododendron can also be extensive as a shrub layer.	Habitats within S20 were partially sampled by Quadrat SL-Wb06, which is similar in composition and therefore S20 is likely to support a similar species assemblage. County
S21	Medium	Series of arable and improved fields with shrubs and trees provided by the border with the riparian woodland.	Habitats within S21 were partially sampled by Quadrat SL-Wb07, which is similar in composition and therefore is likely it supports a similar wintering assemblage. County
S22	Low	Riparian woodland dominated by semi-natural broadleaved woodland that lines much of the burn. Areas of amenity grassland are present within the west of the habitat area (Storybook Glen). Towards the River Dee the habitat area also includes an area of conifer plantation woodland with parkland and scattered broad-leaved and conifer trees associated with Kingcausie.	Habitats within S22 were partially sampled by Quadrat SL-Wb07, which is considered to be similar in composition but more densely wooded. Therefore the Habitat Area is likely to support a similar or more diverse wintering assemblage. Local
S23	Medium	Series of predominantly improved grassland bordered by woodland and with occasional trees and shrubs located on field boundaries. The area also contains a number of dwelling areas with gardens and amenity grasslands. Ancient hedgerows are present within the vicinity of the dwelling houses. Also present is a small broadleaved plantation which is located close to swamp/wet woodland.	Habitats within S23 were partially sampled by Quadrat SL-Wb07, and are similar in composition to habitats within Quadrat SL-Wb09. It is therefore likely to support a similar wintering assemblage. Local
S24	Medium	Series of predominantly improved grassland bordered by woodland and with occasional trees and shrubs located on field boundaries. The area also contains a number of dwelling areas with gardens and amenity grasslands. Ancient hedgerows are present within the vicinity of the dwelling houses.	Habitats within S24 were not sampled by Quadrat but are similar to habitats represented by Quadrat SL-Wb09. Therefore, S24 is likely to support a similar wintering assemblage. Local

Habitat Area	Habitat Value	Habitat Description	Value of Wintering Bird Assemblage
S25	Low	Caravan park with amenity grassland and scattered trees and shrubs.	Habitats within S25 were not sampled by a Quadrat. However, the habitats present were similar to those represented by Quadrat SL-Wb02. Therefore, it is likely that S25 supports a similar wintering assemblage. Less than local
S26	Low	Agricultural fields of improved or semi-improved grassland with scattered broadleaves and conifers and a well-vegetated field drain.	Habitats within S26 were not sampled by a Quadrat but are similar in composition to habitats represented by Quadrat SL-Wb02 and therefore the habitats within S26 are likely to support a similar wintering assemblage. Local
S27	Medium	This area consists of improved fields with trees and scrub frequent along the margins and two wooded pockets of plantation and scrub in the north of the area.	Habitats within S27 were not sampled by a Quadrat but are similar in composition to habitats represented by Quadrat SL-Wb09 and therefore the habitats within S27 are likely to support a similar wintering assemblage. Local
S28	Medium	The western section of this area is dominated by wet willow/alder woodland, with tall ruderals also present. The northeastern banks contain species rich mesotrophic grassland with scattered and dense scrub, plus occasional trees. The southeastern section, however, is primarily composed of woodland.	Habitats within S28 were not sampled by a Quadrat but are similar in composition to habitats represented by Quadrat SL-Wb11 and therefore the habitats within S28 are likely to support a similar wintering assemblage. County
S29	Low	This area comprises of modern buildings with amenity grassland and sculptured gardens on one hand and woodland, much of it broadleaved semi-natural derived from plantation on the other. Trees line most of the area.	S29 was partially sampled by Quadrat SL-Wb08. However, the habitats within this Habitat Area are more diverse, in particular the areas of riparian woodland along the River Dee. Due to the wooded composition of this area, it is not considered to be of any special importance for wintering bird assemblages. Local
S30	Medium	This area comprises of modern buildings with amenity grassland and sculptured gardens. Woodland (AWI), much of it broad-leaved semi-natural derived from plantation, is also present. Trees line most of the area.	Habitats within S30 were partially sampled by Quadrat SL-Wb08. They are similar in composition and therefore S30 is likely to have a similar wintering assemblage. Local
S31	Medium	A corridor of riparian broad-leaved semi-natural woodland (to the south of the river) and semi-improved grassland (to the north of the river). Also present are areas of scrub, arable farmland, conifer plantation and open water.	Habitats within S31 were partially sampled by Quadrat SL-Wb08. S31 is of greater diversity but considered to support a similar wintering assemblage. Local

Section SL4

4.3.4 An evaluation of Habitat Areas within Section SL4 is presented in Table 20.

Table 20 – Evaluation of Habitat Areas for Section SL4

Habitat Areas	Habitat Value	Habitat Description	Value of Wintering Bird Assemblage
S32	Medium	Large sports complexes, schools, nursing homes and hotels dominate the built environment. Amenity grassland dominates the habitat, though areas of woodland and ancient hedgerows are also present. Wooded areas are primarily plantation with occasional patches of semi-natural broadleaves and frequent scattered trees.	Habitats within S32 were partially sampled by Quadrat SL-Wb08. They are similar in composition and therefore S32 is likely to have a similar wintering assemblage. Local
S33	Medium	This area consists of relatively large dwelling houses with gardens, many with mature scattered trees as a border.	Habitats within S33 were partially sampled by Quadrat SL-Wb08. They are similar in composition and therefore S33 is likely to have a similar wintering assemblage. Local
S34	Medium	This area consists of relatively large dwelling houses with gardens, many with mature scattered trees as a border.	Habitats within S34 are composed of similar habitats to part of Quadrat SL-Wb08. Therefore, the habitats and wintering bird assemblage within S34 are likely to be of similar diversity. Local
S35	Low	Scots pine plantation with birch surround. Much of the woodland has now been felled, with abundant dead wood now littering the site.	The habitats within S35 were not sampled by a Quadrat. However, the habitats present are considered to be similar to Quadrat SLWb-03 and are likely to support a similar wintering bird diversity. Local
S36	Medium	A mixture of arable and improved fields with shrubs lining many of the fields. Small pockets of woodland are occasional. A large shelter belt (Western Stretch of Stone Circle) containing matures Scots pine, plus a variety of other conifers and broadleaves is present. Walls divide fields across the majority of the area. Species poor marshy grassland is rare.	Habitats within S36 were partially sampled by Quadrat SL-Wb09, which is considered to be similar although less diverse. Therefore, S36 is likely to support a similar or more diverse wintering assemblage. Local
S37	Medium	Although all connected and, therefore, providing a wooded wildlife corridor, the structure is varied. The west contains a wood with ancient woodland indicators, however, this has been cut back, so the wood is now little more than a large garden. This connects to an area of dense scrub with a new	Habitats within S37 were partially sampled by Quadrat SL-Wb09, which is considered to be representative of habitats within S37. Therefore, S37 is likely to support a similar species assemblage. Local

Habitat Areas	Habitat Value	Habitat Description	Value of Wintering Bird Assemblage
		plantation on amenity grassland to the north, before eventually connecting with areas of predominantly conifer plantation to the north and south.	
S38	Low	Series of improved fields with frequent pockets and field borders of gorse scrub. Walls line many of the fields.	Habitats within S38 were not sampled by a Quadrat but are similar in composition to Quadrat SL-Wb09 which is considered to be representative of habitats within S38. Therefore, S38 is likely to support a similar species assemblage. Local
S39	Medium	Upland habitats dominate this area. Acid grassland is particularly dominant, though dry heath increases in abundance in the south west. Gorse is scattered occasionally around the area. Wall enclosed sheep grazed improved grassland is dominant to the east with occasional trees.	Habitats within S39 were not sampled by a Quadrat but are similar in composition to Quadrat SL-Wb07 and therefore S39 is likely to support a similar wintering assemblage. County

Section SL5

4.3.5 An evaluation of Habitat Areas within Section SL5 is presented in Table 21.

Table 21 – Evaluation of Habitat Areas for Section SL5

Habitat Areas	Habitat Value	Habitat Description	Value of Wintering Bird Assemblage
S40	Medium	Improved fields with abundant marshy grassland and rocky outcrops dominate. The small channel of Silver Burn runs through the area.	Habitats within S40 were partially sampled by Quadrat SL-Wb10 which is considered to be representative of habitats within S40 and therefore likely to support a similar wintering assemblage. Local
S41	Low	Coniferous plantation woodland with open clearings.	Habitats within S41 were not sampled by a Quadrat but are similar in composition to habitats represented by Quadrat SL-Wb03. However, S41 is smaller in size and botanically less diverse and therefore it is likely to support a similar or less diverse wintering assemblage. Less than Local
S42	Medium	Improved/semi-improved grasslands with frequent areas of species poor marshy grassland.	Habitats within S42 not sampled by a Quadrat. However, the area is considered to be of a similar composition to Quadrat SL-Wb06. Therefore, S42 is likely to support a similar wintering assemblage. County
S43	Low	Plantation conifer woods dominate. Beech can be frequent and sometimes dominant in the canopy. Scots	Habitats within S43 were partially sampled by Quadrat SL-Wb10 which is not considered to be representative. S43 is considered

Habitat Areas	Habitat Value	Habitat Description	Value of Wintering Bird Assemblage
		pine probably dominates overall but there is a mix of plantings. Under the Scots pine and larch woodlands, a dry heath community is present.	to be better represented by Quadrat SL-Wb03 and therefore likely to support a similar wintering assemblage to this Quadrat. Local
S44	Low	This area is dominated by improved and arable fields. Walls are dominant feature of the borders between fields with gorse occasional.	Habitats within S44 were partially sampled by Quadrat SL-Wb11 which his not representative. S44 is considered to be better represented by Quadrat SL-Wb09 and therefore it is likely that it supports a similar wintering assemblage to this Quadrat. Local
S45	High	High scrub of willow on wet grassland. Areas of birch are also present. Where trees have been removed, marsh dominates, although areas of swamp are also present.	Habitats within S45 were sampled by Quadrat SL-Wb11 and are considered to be of a similar composition and therefore it is likely that S45 will support a similar wintering assemblage. County

Section SL6

4.3.6 An evaluation of Habitat Areas within Section SL6 is presented in Table 22.

Table 22 – Evaluation of Habitat Areas for Section SL6

Habitat Areas	Habitat Value	Habitat Description	Value of Wintering Bird Assemblage
S46	Medium	This area is comprised of many relatively small improved and poor semi-improved fields. Dry stone walls surround many of the fields with gorse and broom shrubs frequently lining many of the fields.	Habitats within S46 were partially sampled by Quadrat SL-Wb12 which is considered to be representative of habitats within S46 and therefore it is likely that it supports a similar wintering assemblage. County
S47	Medium	A mosaic of semi-natural broad-leaved woodland, deciduous parkland/scattered trees and dense scrub.	Habitats within S47 were not sampled by a Quadrat, However, they are considered to be similar to those represented by Quadrat SL-Wb12. Therefore, it is likely S47 supports a similar wintering assemblage. Local
S48	Medium	This mosaic of communities is dominated by improved grassland bordered by stone walls, the majority of which are tree and shrub lined. Pockets of coniferous woodland, with some dense scrub are frequent in the northern half. The south of the site is dominated by mesotrophic semi-improved grassland with acid characteristics, plus pockets of more typical acid grassland. Scattered trees and scrub are present throughout.	Habitats within S48 were partially sampled by Quadrat SL-Wb12 which is considered to be representative. Therefore it is likely that it supports a similar wintering assemblage. County

5 Potential Impacts

5.1 Introduction

5.1.1 Impacts (both short and long-term) can either be positive or negative and are identified and described for both construction and operation of the proposed scheme, in the absence of mitigation measures. It should be noted that the impacts associated with the operational phase of the scheme are considered to be permanent, whereas temporary impacts, which are only apparent while the road is being built, are discussed in association with the construction phase.

5.1.2 Potential impacts associated with construction and operation of the proposed scheme on wintering bird assemblages include direct mortality, habitat loss, habitat fragmentation/isolation, disturbance and pollution/other indirect impacts. These adverse effects frequently interact (i.e. habitat loss during construction can potentially result in disturbance and habitat fragmentation) and the resulting combination of impacts may, through synergistic effects, significantly increase the overall negative impact of the proposed scheme (Luell et al., 2003).

Direct Mortality

Construction

5.1.3 Habitat loss resulting from clearance of vegetation prior to construction is unlikely to result in the direct mortality of wintering birds as they are able to escape by moving into unaffected adjacent habitats.

Operation

5.1.4 Many bird species will attempt to cross active roads to move between habitat fragments that arise as a direct result of operational habitat fragmentation and isolation and the barrier effects that road development imposes on species movement (Salter, 1994).

5.1.5 Van Apeldoorn (1995) states that high mortality rates associated with operational roads reduces the exchange of bird populations between habitats and thus increases isolation effects, demonstrating the link between mortality and barrier effects caused by fragmentation.

5.1.6 An increase in direct mortality resulting from habitat fragmentation associated with an increase in number of roads and road traffic within the UK has been highlighted as a major component in the decline of some bird species such as the barn owl. Indeed, twice as many barn owls are now killed by road traffic (an estimated 5,000 individuals per annum) on UK roads as compared with the 1950's, and in some areas suitable habitat no longer supports barn owl populations (English Nature, 1996).

5.1.7 Roads can also create unexpected sources of mortality, for example, there have been several documented cases of bird mortality from road salt. Finches, in particular, are attracted to salt, probably to satisfy a dietary need. This can cause mortality through vehicle collision and also through the toxic effects of the ingested salt (Mineau and Brownlee, 2005).

5.1.8 In contrast, some bird species actively benefit from living near roads such as certain members of the corvid family, for example magpie and carrion crow, which regularly scavenge on road kills (Slater, 1994). However, none of these species are species of conservation concern.

5.1.9 The proposed scheme would constitute a new off-line road through a range of habitats where no comparable road currently exists. The scheme may result in an increase in mortality (in addition to fragmentation and isolation) of wintering birds through road traffic accidents (RTAs), this impact is most likely to occur where birds do not have time to avoid road traffic travelling at speed. RTAs typically occur where woodland or scrub habitats are located immediately adjacent to busy roads and it is likely that low flying bird species (e.g. members of the thrush family) will be the greatest

affected.

Habitat Loss

Construction and Operation

5.1.10 One of the direct impacts of the proposed scheme would be the physical loss of breeding and foraging habitats along a route corridor that would be replaced or altered by transport infrastructure. The impacts associated with direct habitat loss are additionally increased by the interaction of disturbance and fragmentation/isolation impacts which, if combined, can lead to a change in the distribution of species within a route corridor or wider study area (Luell et al., 2003).

5.1.11 Habitat clearance would additionally result in the direct loss of foraging habitat through the loss of plant food groups such as buds or berries and the indirect loss of invertebrate communities (which form a major dietary constituent for the majority of small to medium sized bird species (e.g. redwing or fieldfare).

5.1.12 Removal/clearance of surrounding vegetation and/or buildings may possibly alter the availability of shelter for wintering birds increasing their vulnerability to a range of external factors such as adverse conditions and/or predators.

5.1.13 The total amount of landtake required in order to construct the Southern Leg of the proposed scheme is estimated at approximately 2.77km^2 / 277ha. Table 23 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 23 – Phase 1 Habitat Areas Pre and Post Construction

Phase 1 Habitat Description	Phase 1 Habitat Categories within scheme land-take	
	Pre-construction (ha)	Post-construction (ha)
Woodland mixed plantation	2.43	27.86
Woodland broadleaved plantation (Including standard trees)	2.78	7.43
Woodland broadleaved semi-natural	2.90	1.25
Woodland coniferous plantation	15.41	8.59
Scattered scrub	3.55	6.78
Dense continuous scrub	3.58	7.73
Riparian woodland	0	3.03
Acid grassland semi-improved	4.84	3.40
Acid grassland unimproved	0.09	0.06
Amenity grassland	0.01	0.01
Improved grassland	122.66	66.29
Marshy grassland	4.66	3.63
Neutral grassland semi-improved	3.59	1.85
Neutral grassland unimproved	1.57	0.79
Poor semi-improved grassland	23.45	12.77
Disturbed amenity grassland	0.08	0.06
Arable	43.92	18.70*

Phase 1 Habitat Description	Phase 1 Habitat Categories within scheme land-take	
	Pre-construction (ha)	Post-construction (ha)
Built up areas (buildings)	2.51	3.03
Open water	0.36	0.57
Parkland mixed	3.22	4.35
Fen	0.39	0.60
Heath - acid grassland dry mosaic	0.08	0.13
Recently felled coniferous	0.34	0.58
Wet bog	0.52	0.63
Bare ground	1.58	1.80
Herb and fern tall ruderal	0.18	0.36
Total	244.70	182.29

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

5.1.14 Although occurring during the construction phase, habitat loss is regarded as an operational impact as the loss would be permanent. Further permanent habitat loss may occur through the occasional operational management of roadside habitats (i.e. mowing of verges or trimming of scrub/trees). Operation of the proposed scheme could also result in a reduction in the abundance of invertebrate communities within the immediate vicinity of the proposed scheme and thus indirectly impact bird populations through a reduction in food availability.

5.1.15 Temporary habitat loss associated with the construction and use of site compounds and other temporary structures, for example, access tracks, bridges or storage areas will result in the temporary destruction of potential wintering bird habitat, the effects of which are described above. However, it should be noted that the level of permanence (in terms of loss) will vary and is dependant on location/s that are currently unknown.

5.1.16 Operation of the proposed scheme could result in a reduction in the abundance of invertebrate communities within the immediate vicinity of the proposed scheme in particular as a result of pollution, which may include road salting, oil and fuel spillage resulting in an indirect impact to bird populations through a reduction in food availability.

5.1.17 In addition, indirect habitat loss can occur in areas adjacent to the proposed road, where an increase in noise and pollution from the traffic using the road can lead to birds moving out of the area and thus rendering potentially suitable habitat as unsuitable for wintering bird populations.

Habitat Fragmentation and Isolation

Construction and Operation

5.1.18 Habitat fragmentation occurs when a road development imposes a barrier to the natural dispersal of animals resulting in disrupted movement across a site (English Nature, 2001). Research undertaken by English Nature (1994) suggests that habitat fragmentation may have a greater impact than isolation, but that the isolation effect incurred by species imposed by fragmentation is increased by the barrier effects of roads in conjunction with disturbance and mortality, (particularly with regard to low flying species).

5.1.19 The loss of contiguous habitat due to fragmentation is now considered to be one of the most important factors in accelerating the reduction in worldwide biodiversity (Wilson, 1992, In: English Nature, 2001).

5.1.20 Some species will not inhabit areas within several hundred meters of a road. While the barrier effect imposed by the proposed scheme to birds is difficult to assess due to it being variable between species, as a general rule, the busier and wider the road the more effective barrier it is to dispersion (English Nature, 2001).

5.1.21 Construction of the proposed scheme is likely to have significant fragmentation and isolation impacts on bird populations within the survey corridor through the severing and subsequent isolation of bird populations within pre-existing habitats. This fragmentation and isolation will have a negative impact on local bird populations through a reduction in dispersal and subsequent isolation of species, which could potentially result in a reduction in population size and in some instances localised extinction of bird species. The extent of these impacts is likely to be dependent on the size of the isolated area of habitat and the species affected, as the ability to avoid genetic isolation and localised extinctions by moving between fragmented habitats varies between bird species.

5.1.22 Operation of the proposed scheme is also likely to have significant fragmentation and isolation impacts on bird populations through a restriction in dispersal and movement of species between habitats (fragmented by construction) resulting from habitat loss associated with minimal operational maintenance (refer to paragraph 5.1.10) and noise and vibration disturbance (caused by road traffic, refer to paragraph 5.1.22). The continued fragmentation and isolation of bird species within severed habitats could have a detrimental effect on species population dynamics and ultimately viability.

Disturbance

Construction

5.1.23 Disturbance resulting from noise and vibration associated with construction of the proposed scheme will occur in two chronological stages. The first will comprise disturbance resulting from construction habitat clearance (refer to paragraph 5.1.10) followed by the second will comprise both direct disturbance (for example, from excavation) and indirect disturbance. This would result from human activity associated with construction of the proposed scheme which will contribute to an increase in the effects of fragmentation and isolation.

5.1.24 Disturbance resulting from light pollution associated with construction during low light levels in winter/autumn and/or 24-hour construction could result in disturbance to wintering birds located within habitats adjacent to the proposed scheme, potentially leading to some species of bird abandoning their habitats at a local level if the disturbance reaches a significant level. The severity of the impact will vary according to the frequency and magnitude of the disturbance and the species involved.

5.1.25 The location of temporary site compounds/offices (which may be operational 24 hours a day) near sensitive habitats, for example wetlands, could result in significant disturbance to wintering birds resulting from noise, vibration and light pollution in additional to physical disturbance from the presence of construction workers and heavy plant.

Operation

5.1.26 Research undertaken by Reijnen et al. (1997) and Reijnen and Foppen (1994) has shown that operational noise is a primary factor in altering the density of bird populations adjacent to roads and highways.

5.1.27 Studies have shown that road traffic noise exceeding 50dBA can reduce bird density (40dBA for some woodland species) in adjacent habitats, while in comparison, some bird species appeared unaffected by disturbance (COST, 2004).

5.1.28 Disturbance resulting from noise and vibration associated with operation of the proposed scheme

will be mainly influenced by traffic type, traffic intensity, road surface properties, topography and structure/type of adjacent vegetation, the magnitude and spread of which is in turn influenced by underlying geology and soil characteristics (COST, 2004).

5.1.29 Light pollution can have adverse impacts on wintering bird species and can affect foraging behaviour in a number of species of bird. This impact was first observed by Rawson (1923) who demonstrated the correlation between critical light levels at dawn and singing in thrushes and suggested that artificial lighting could modify the timing of natural behavioral patterns.

5.1.30 Hill (1992) observed that seabirds were disorientated by street lights on cloudy nights and observed that redshank and oystercatchers were observed feeding within 50m of artificial lighting at night, while flocks of dunlin were observed roosting near to a large roundabout with flood lighting.

5.1.31 Outen (undated) and Hill (1992) found that nocturnal bird species such as barn owl are sensitive to the presence of bright illumination and that artificial lighting has the potential to provide more feeding time for birds but could have a negative impact on prey abundance leading to food shortages.

Pollution and Other Indirect Impacts

Construction

5.1.32 Accidental spills of chemicals and other potentially toxic substances during construction of the proposed scheme may occur and are of particular concern if they happen within proximity of ecological sensitive communities or rivers and/or streams. The severity and magnitude of the pollution impact would depend on the constituents, toxicity to biodiversity and discharge/spill volume of the pollutant in question.

Operation

5.1.33 Pollutants and toxins are derived from road traffic and road surfaces. The exhaust fumes produced by road vehicles contain a number of pollutants ranging from carbon monoxide, nitrogen oxide and sulphur dioxide to hydrocarbons and dioxins, while cars themselves produce a number of heavy metals ranging from lead to cadmium. These chemicals and gases can potentially pollute surface and groundwater, soil and vegetation (Luell et al., 2003).

5.1.34 Research conducted by Ballard and Hacker (1996) has shown that de-icing salt used in the winter to keep roads ice-free can potentially result in the death of seed eating birds such as finches, which consume seeds contaminated by salt. The application of de-icing salt to the proposed scheme during the winter and the indirect pollution of adjacent habitats via vehicle spray could potentially result in the death of seed eating bird species foraging in habitats located adjacent to the proposed scheme. It is not possible to estimate the average amount of salt spread because this is dependant on the rate of salt spread and speed of the spreader. However, wide verges with varied nut or berry bearing planting are likely to be most impacted.

5.1.35 It is likely that pollution derived from road traffic on many existing roads would decrease as a result of a reduction in local congestion and the movement of traffic onto the AWPR, for example, within the City of Aberdeen. However, a reduction in local traffic congestion would result in an increase in road traffic pollution at district to regional level as more road traffic uses the AWPR to avoid local congestion. Furthermore, current road traffic pollution effects habitats and species within a built up environment, the proposed scheme and the road traffic using it would introduce pollution into greenspace habitats and associated species.

5.1.36 Insufficient research has been undertaken to date regarding the direct impacts that operational roads have on the abundance of invertebrate communities and the indirect impacts on bird species through a reduction in food availability. The only survey conducted to date in the UK was

undertaken by the RSPB in 2004 (www.rspb.org.uk/bugcount). The study observed that in total, one invertebrate was killed for every five miles travelled.

5.1.37 Spills and/or accidental discharge associated with construction and operation within or in close proximity to the following watercourses, waterbodies and/or wetland areas could constitute a key impact; Loirston Burn, Greengate Ditch, Burn of Ardoe, Bishopston Ditch, Heathfield Burn, Jameston Ditch, Hare Moss, Whitestone Burn, Burnhead Burn, Crynoch Burn, Blaikiewell Burn, Kingcausie Burn, River Dee, Milltimber Burn, Culter House Ditch, Beans Burn, Upper Beanshill Burn, Gairn Burn, Moss of Auchlea, Moss of Auchlea drainage system and Westholme Burn

5.2 Specific Impacts

5.2.1 A description of potential impacts on bird species in the study area is provided in Table 24.

Table 24 − Summary Description of Potential Impacts on Bird Species of Conservation Concern

Bird Species	Habitat/s of Value	Impacts
barn owl	Resident species. Breeds and winters in open country, especially farmland with barns and coastal marshland.	Loss and fragmentation of wintering habitat (farmland) with disturbance during both construction and operation phases. Direct mortality (RTA due to low flight patterns) during operation.
black-headed gull	Resident species. Breeds and winters in coastal marshes, upland pools, farmland and in built up areas.	Unlikely to be impacted by loss of wintering habitat or disturbance. Direct mortality from ingestion of pollutants due to scavenging behaviour could occur.
bullfinch	Resident species. Breeds and winters in orchards, parks, woodlands and scrub.	Loss and severance of wintering habitat (woodland and scrub) during operation of the scheme. Disturbance during construction and operation.
common gull	Resident species. Breeds on moorland, marshes, bogs and cliffs. Winters on farmland, playing fields and reservoirs.	Unlikely to be impacted by loss of wintering habitat or disturbance. Direct mortality from ingestion of pollutants due to scavenging behaviour could occur.
cormorant	Resident species. Breeds on coastal cliffs and rocky islands. Often winters inland in trees by freshwater lakes, gravel pits and reservoir.	Disturbance during both construction and operation. Pollution to waterbodies during construction and operation.
crossbill	Resident species. Breeds and winters in Scots pine, spruce and larch trees, especially mature forest and old plantations.	Loss and fragmentation of wintering habitat (coniferous woodland) during operation. Disturbance during construction and operation phases.
curlew	Resident species. Breeds on areas of damp moorland and pasture. Winters on estuaries and damp grassland.	Loss and fragmentation of wintering habitat (pasture and marshy grassland) during operation. Disturbance during construction. Species in the long term is unlikely to be disturbed during operation due to habituated of road traffic.
dunnock	Resident species. Breeds and winters in gardens, parks, woodland, waste ground and hedges.	Loss and fragmentation of wintering habitat (woodland, hedgerow and scrub) during operation. Disturbance during construction. Disturbance during operation in unlikely to constitute a significant impact.
fieldfare	Winter visitor. Winters in open countryside, grass fields and (particularly hawthorn) hedgerows, fruit bearing trees and gardens.	Loss and fragmentation of wintering habitat, (fields and hedgerows). Disturbance during construction. Disturbance during operation in unlikely to constitute a significant impact.
goldcrest	Resident species. Breeds and winters in coniferous woodlands, occurring in deciduous woodland, scrub and even gardens in winter.	Loss and fragmentation of wintering habitat (conifer woodlands) during operation. Disturbance during construction. Disturbance during operation is unlikely to constitute a significant impact.

Bird Species	Habitat/s of Value	Impacts
goldeneye	Resident species. Breeds in forests near to lakes and rivers. Winters in inland lakes and reservoirs.	Disturbance during construction. Pollution to waterbodies during construction and operation.
grey partridge	Resident species. Breeds and winters on farmland, grassland and arable fields.	Loss and fragmentation of wintering habitat (arable farmland and fields) during operation. Disturbance during both construction and operation. Possible risk of RTAs during operation due to low flight pattern.
grey wagtail	Resident species. Breeds in woodland or scrub near rivers and streams. Winters near more lowland water courses, also seen in urban, suburban settings.	Loss and fragmentation of riparian / woodland habitats during operation. Disturbance during construction. Pollution to waterbodies during construction and operation.
greylag goose	Winter visitor. Winters on arable fields, pastures, lakes and reservoirs.	Loss and fragmentation of wintering habitat during during operation. Disturbance during construction. Disturbance during operation in unlikely to constitute a significant impact.
herring gull	Resident species. Breeds on rocky coastal edges and more recently, buildings. Winters more inland by freshwater lakes.	Unlikely to be impacted by loss of wintering habitat or disturbance. Direct mortality from ingestion of pollutants due to scavenging behaviour could occur.
house sparrow	Resident species. Breeds in urban environment, in rood tiles, air ducks, recesses and occasionally trees. Winters gregariously in farmland fields and hedgerows.	Loss and fragmentation of wintering habitat (buildings, farmland and hedgerows) during operation. Disturbance during construction. Unlikely to be impacted by disturbance during operation. Direct mortality from ingestion of pollutants could occur.
kestrel	Resident species. Found ubiquitously providing open rough ground for foraging is within the local proximity.	Loss and fragmentation of wintering habitat (unmanaged grassland, farmland) during operation. Disturbance during construction. Disturbance during operation in unlikely to constitute a significant impact. Direct mortality (from possible RTAs) during operation
linnet	Resident species. Breeds in scrub on moorland, heaths and farmland. Winters in stubble and weedy fields.	Loss and fragmentation of wintering habitat (farmland and grassland) during operation. Disturbance during construction. Disturbance during operation is unlikely to constitute a significant impact.
meadow pipit	Resident species. Breeds in open country, moors and heaths, coastal meadows, pastures and bogs.	Loss and fragmentation of wintering habitat (grassland, heathland and bog) during operation. Disturbance during construction. Disturbance during operation is unlikely to constitute a significant impact.
mistle thrush	Resident species. Breeds in woods, parks, gardens and orchards. Also found in winter in fields and moorland edges.	Loss and fragmentation of wintering habitat (gardens, agricultural fields) during operation. Disturbance during construction. Disturbance during operation is unlikely to constitute a significant impact. Possible risk of RTAs due to low flight patterns.
mute swan	Resident species. Breeds and winters on lakes, slow flowing rivers and nearby fields.	Disturbance during construction. Disturbance during operation in unlikely to constitute a significant impact. Risk of pollution to waterbodies/watercourses during construction.
oystercatcher	Resident species. Breeds on grass fields and shingle beside lakes, rivers and seashores. Winters on estuaries, sandy beaches and open fields.	Loss and fragmentation of wintering habitat (farmland and grassland) during operation. Disturbance during construction. Disturbance during operation is unlikely to constitute a significant impact.
pink-footed goose	Winter visitor. Winters on moorland, lowland marshes, arable farmland, mudflats and freshwater lakes.	Loss and fragmentation of wintering habitat.during operation Disturbance during construction. Disturbance during operation in unlikely to constitute a significant impact.
pochard	Resident species. Breeds and winters on lowland lakes, flooded gravel pits and reservoirs; also	Disturbance during construction. Pollution to waterbodies during construction and operation. Some fragmentation and loss of wintering habitat (marsh).

Bird Species	Habitat/s of Value	Impacts
	winters on open marshes.	
redwing	Winter visitor. Winters in open countryside, grass fields and (particularly hawthorn) hedgerows, fruit bearing trees and gardens.	Loss and fragmentation of wintering habitat (fields and hedgerows) during operation. Disturbance during construction. Disturbance during operation in unlikely to constitute a significant impact.
reed bunting	Resident species. Breeds and winters in reedbeds, upland and lowland marshes and farmland. Also visits gardens in winter.	Loss, fragmentation and possible pollution of wintering habitat (riparian corridors, marshland and scrub/hedgerows operation) during operation. Disturbance during construction. Disturbance during operation is unlikely to constitute a significant impact.
skylark	Resident species. Breeds on moorland, farmland, dunes and grassland. Winters on rough grassland, stubble and saltmarsh.	Loss of wintering habitat (arable and grassland) during operation. Disturbance during construction. Disturbance during operation is unlikely to constitute a significant impact.
snipe	Resident species. Breeds in marshes and boggy areas. Winters on salt marshes, coastal lagoons and other marshy areas.	Loss and fragmentation of wintering habitat (marshland and boggy areas) during operation. Disturbance during construction. Disturbance during operation is unlikely to constitute a significant impact. Possible risk of RTAs due to low flight patterns. Pollution to marshland during construction and operation
song thrush	Resident species. Breeds and winters in gardens, farmland, woodland and hedges.	Loss and fragmentation of wintering habitat (woodland, scrub, gardens, agricultural fields) during opeation. Disturbance during construction. Disturbance during operation is unlikely to constitute a significant impact. Possible risk of RTAs due to low flight patterns.
starling	Resident species. Breeds in towns, woods, parks, and on farms. Winters in cities, gardens and farmland.	Loss of wintering habitat (agricultural land, parks and gardens). Disturbance during construction and operation is unlikely to constitute a significant impact.
stock dove	Resident species. Breeds and winters in parkland, disused buildings, wooded farmland and open forests.	Loss and fragmentation of wintering habitat (woodland) during operation. Disturbance during construction.
teal	Resident species. Breeds and winters on shallow pools, ponds, wetlands and estuaries.	Disturbance during construction. Pollution to waterbodies during construction and operation.
tree sparrow	Resident species. Breeds and winters in woodland, farmland and scrub, nesting in holes in trees or buildings.	Loss and fragmentation of wintering habitat (scrub/woodland and hedgerows) during operation. Disturbance during construction and operation.
twite	Resident species. Breeds in rough corries, rough grazed grassland. Winters on saltmarsh, stubble fields, reedbeds, and bramble thickets.	Loss and fragmentation, of habitats (agricultural areas) during operation. Disturbance during construction.
wigeon	Resident species. Breeds and winters on shallow pools, ponds, wetlands and estuaries.	Disturbance during construction. Pollution to waterbodies during construction and operation.
woodcock	Resident species. Large tracts of open woodland with open glades and rides.	Loss and fragmentation of wintering habitat (scrub/woodland and hedgerows) during operation. Disturbance during construction and operation.
yellowhammer	Resident species. Breeds and winters in hedgerows and scrub, especially gorse and hawthorn thickets.	Loss and fragmentation of wintering habitat (farmland and grassland) during operation. Disturbance during construction and operation.

5.3 Potential Impacts on Habitat Areas

5.3.1 Potential impacts to wintering bird populations throughout Sections SL1 – SL6 during construction and operation of the proposed scheme are likely to include:

- direct mortality;
- direct and in-direct habitat loss;
- habitat severance, fragmentation and isolation;
- disturbance; and
- pollution.

5.3.2 Habitat Areas that would not be affected during construction or operation of the proposed scheme have not been considered as part of this assessment.

5.3.3 A description and assessment of specific impacts is provided in Table 25. With respect to construction and operation and unless otherwise stated in Table 25, the risk of direct mortality (including operational RTAs), fragmentation and disturbance resulting from clearance and loss of low value habitats (arable or improved/amenity grassland) is assessed as being a low negative impact. In comparison, the above impacts resulting from clearance and loss of high value habitats (such as woodland, scrub, unimproved/semi-improved/marshy grassland, heath and bog) is assessed as being a medium negative impact. Pollution to aquatic habitats resulting from accidental spills or surface runoff is assessed as being a medium negative impact. Whereas, pollution to solely terrestrial habitats is assessed as being a low negative impact.

5.3.4 Impacts associated with the location of temporary work compounds cannot be assessed at this stage until the location of temporary work compounds is determined. However, the siting of such compounds will be in cognisance of ecological advice and will be such as to cause minimal impact.

5.3.5 Key bird species outlined in Table 24 (JNCC Red List, JNCC Amber List, UK BAP and LBAP) likely to be effected by the impacts described above have been inferred through an assessment of the baseline information based on professional judgement.

Section SL1

5.3.6 Eight Habitat Areas and the bird assemblages they support would be affected during construction and operation of the proposed scheme, including: S2, S3, S5, S6, S7, S8, S9 and S10.

5.3.7 Predicted impact magnitude and significance for wintering birds during construction and operation has been assessed as medium negative and Moderate in Habitat Areas S6 and S10 due to potential pollution of Loirston Burn, Loirston Loch and Ardoe Burn.

Section SL2

5.3.8 Four Habitat Areas and the bird assemblages they support would be affected during construction and operation of the proposed scheme, including: S11, S13, S14 and S16.

5.3.9 Predicted impact magnitude and significance for wintering birds during construction and operation has been assessed as medium negative and Moderate in S13 and S16 due to potential for pollution of Heathfield Burn, Bishopston Ditch and Whitestone Burn.

Section SL3

5.3.10 Ten Habitat Areas and the bird assemblages they support would be affected during construction and operation of the proposed scheme, including: S17, S19, S20, S22, S23, S24, S27, S28, S29

and S31.

5.3.11 Predicted impact magnitude and significance for wintering birds during construction and operation has been assessed as medium negative and Moderate in S28 due to potential for pollution of the River Dee.

Section SL4

5.3.12 Six Habitat Areas and the bird assemblages they support would be affected during construction and operation of the proposed scheme, including; S32, S34, S36, S37, S38 and S39. There would be no impacts of Moderate or above significance to wintering birds in this section.

Section SL5

5.3.13 Four Habitat Areas and the bird assemblages they support would be affected during construction and operation of the proposed scheme, including: S40, S42, S43 and S44.

5.3.14 Predicted impact magnitude and significance for wintering birds during construction and operation has been assessed as medium negative and Moderate in S42 due to potential for pollution of Gairn Burn.

Section SL6 (A944 – Derbeth Overhills)

5.3.15 Three Habitat Areas and the bird assemblages they support would be affected during construction and operation of the proposed scheme including: S46, S47 and S48.

5.3.16 Predicted impact magnitude and significance for wintering birds during construction and operation has been assessed as medium negative and Moderate in S46 due to potential for pollution of Westholme Burn.

Table 25 – Potential Impacts

HA	Evaluation	Phase	Description of Impacts	Impact Magnitude / Significance
Section SL1				
S1	Local	Construction	Disturbance due to clearance	Low negative/Minor
		Operation	Direct mortality through RTA. Disturbance and habitat loss of broad-leaved plantation.	
S2	Local	Construction	Fragmentation / isolation and disturbance due to clearance.	Low negative/Minor
		Operation	Direct mortality due to RTA. Fragmentation and isolation, disturbance and habitat loss of improved grassland, marshy grassland, scattered scrub, occasional standard trees and mixed plantation.	
S3	Local	Construction	Fragmentation / isolation and disturbance due to clearance.	Low negative/Minor
		Operation	Direct mortality due to RTA. Fragmentation / isolation, disturbance and habitat loss of coniferous plantation, broad-leaved standard trees, semi-improved neutral grassland and Greenhowe Pond.	Low negative/Minor
S5	Local	Construction	Disturbance due to clearance.	Negligible/Negligible
		Operation	Direct mortality due to RTA. Disturbance and habitat loss of arable land and improved grassland.	
S6	County	Construction	Fragmentation and isolation, disturbance and potential for pollution to Loirston Burn/Loirston Loch due to accidental spills.	Medium negative/Moderate
		Operation	Direct mortality due to RTA, fragmentation and isolation, potential for pollution to Loirston Burn/Loirston Loch due to runoff and habitat loss of coniferous plantation.	
S7	Local	Construction	Fragmentation / isolation and disturbance due to clearance.	Low negative/Minor
			Potential for pollution of Greenhowe Ditch due to accidental spills.	Medium negative/Minor
		Operation	Direct mortality due to RTA, fragmentation and isolation, disturbance and habitat loss of dense pine plantation.	Low negative/Minor
			Potential for pollution of Greenhowe Ditch.	Medium negative/Minor
S8	Local	Construction	Fragmentation / isolation and disturbance due to clearance.	Low negative/Minor
		Operation	Direct mortality due to RTA. Fragmentation and isolation, disturbance and habitat loss of improved, poor semi-improved and arable fields.	Medium negative/Minor
S9	Local	Construction / Operation	Disturbance only.	Negligible/Negligible
S10	County	Construction	Disturbance due to clearance.	Low negative/Minor
			Potential for pollution of Burn of Ardoe due to accidental spills.	Medium negative/Moderate
		Operation	Direct mortality due to RTA, disturbance and habitat loss of wet modified bog.	Low negative/Minor
			Potential for pollution of Burn of Ardoe due to runoff.	Medium negative/Moderate
Section SL2				
S11	Local	Construction / Operation	Disturbance.	Negligible/Negligible
S13	County	Construction	Fragmentation / isolation and disturbance due to clearance.	Low negative/Minor
			Potential for pollution of Heathfield Burn and Bishopston Ditch due to accidental spills.	Medium negative/Moderate

HA	Evaluation	Phase	Description of Impacts	Impact Magnitude / Significance
		Operation	Direct mortality through RTA. Isolation and fragmentation, disturbance and habitat loss of improved, semi-improved grassland with occasional broad-leaved copses and marshy grassland.	
			Potential for pollution of the Heathfield Burn and Bishopston Ditch due to runoff.	
S14	Local	Construction	Disturbance due to clearance.	Negligible/Negligible
		Operation	Direct mortality due to RTA. Disturbance and habitat loss of dense scrub.	Low negative/Minor
S16	County	Construction	Fragmentation / isolation and disturbance due to clearance.	Low negative/Minor
			Potential for pollution of Whitestone Burn due to accidental spills.	Medium negative/Moderate
		Operation	Direct mortality due to RTA. Fragmentation and isolation, disturbance and habitat loss of improved grassland, marshy grassland, dense/continuous scrub and occasional broad-leaved standard trees.	
			Potential for pollution of the Whitestone Burn due to runoff.	
Section SL3				
S17	County	Construction	Fragmentation / isolation and disturbance due to clearance.	Low negative/Minor
		Operation	Direct mortality due to RTA. Fragmentation and isolation, disturbance and habitat loss of improved grassland and occasional broad-leaved trees.	
S19	Local	Construction	Fragmentation and isolation, disturbance due to clearance and potential for pollution of the Burnhead Burn and Blaikiewell Burn due to accidental spills.	Medium negative/Minor
		Operation	Direct mortality through RTA. Fragmentation and isolation, disturbance, habitat loss of semi-improved grassland, arable, scattered scrub, and sections of native species rich hedgerows interspersed with trees and potential for pollution of the Burnhead Burn and the Blaikiewell Burn due to runoff.	
S20	County	Construction	Fragmentation / isolation and disturbance due to clearance.	Low negative/Minor
		Operation	Direct mortality due to RTA. Fragmentation and isolation, disturbance and habitat loss of coniferous plantation woodland.	
S22	Local	Construction	Fragmentation / isolation and disturbance due to clearance.	Low negative/Minor
			Potential for pollution of the Blaikiewell Burn, Crynoch Burn and River Dee due to accidental spills.	Medium negative/Minor
		Operation	Direct mortality through RTA. Fragmentation and isolation, disturbance and habitat loss of riparian woodland.	Low negative/Minor
			Potential for pollution of the Blakiewell Burn, Crynoch Burn and River Dee due to runoff.	Medium negative/Minor
S23	Local	Construction	Fragmentation / isolation and disturbance due to clearance.	Low negative/Minor
		Operation	Direct mortality due to RTA, fragmentation and isolation, disturbance and habitat loss of improved, semi-improved grassland and occasional broad-leaved trees.	Low negative/Minor
S24	Local	Construction	Fragmentation / isolation and disturbance during construction.	Low negative/Minor
			Potential for pollution of the Kingcausie Burn, Crynoch Burn and River Dee due to accidental spills.	Medium negative/Minor
		Operation	Direct mortality through RTA, fragmentation and isolation, disturbance and habitat loss of broad-leaved woodland, standard broad-leaved trees and improved grassland.	

HA	Evaluation	Phase	Description of Impacts	Impact Magnitude / Significance
			Potential for pollution of the Kingcausie Burn and the Crynoch Burn due to runoff.	
S27	Local	Construction	Fragmentation / isolation and disturbance due to clearance.	Low negative/Minor
			Potential for pollution of the River Dee due to accidental spills.	Medium negative/Minor
		Operation	Direct mortality due to RTA, fragmentation and isolation, disturbance, loss of improved and neutral semi-improved grassland.	Low negative/Minor
			Potential for pollution of the River Dee due to runoff.	Medium negative/Minor
S28	County	Construction	Fragmentation / isolation and disturbance during construction.	Low negative/Minor
			Potential for pollution of the River Dee due to accidental spills.	Medium negative/Moderate
		Operation	Direct mortality through RTA, fragmentation and isolation, disturbance and habitat loss of riverine habitats.	Low negative/Minor
			Potential for pollution of the River Dee due to runoff.	Medium negative/Moderate
S29	Local	Construction	Fragmentation / isolation and disturbance due to construction.	Low negative/Minor
			Potential for pollution of the Milltimber Burn and the River Dee due to accidental spills.	Medium negative/Minor
		Operation	Direct mortality due to RTA, fragmentation and isolation, disturbance and habitat loss of arable and improved grassland.	
			Potential for pollution of Milltimber Burn and the River Dee due to runoff.	
S31	Local	Construction	Fragmentation / isolation and disturbance due to clearance.	Low negative/Minor
		Operation	Direct mortality due to RTA, fragmentation and isolation, disturbance and habitat loss of broad-leaved woodland.	Low negative/Minor
Section SL4				
S32	Local	Construction	Fragmentation / isolation and disturbance due to construction.	Low negative/Minor
			Potential for pollution of Culter House Burn due to accidental spills.	Medium negative/Minor
		Operation	Direct mortality due to RTAs, fragmentation and isolation, disturbance and habitat loss of buildings and hardstanding, amenity grassland, standard broad-leaved trees and bare ground.	
			Potential for pollution of Culter House Burn due to runoff.	
S34	Local	Construction	Disturbance due to clearance.	Low negative/Minor
		Operation	Direct mortality due to RTA, disturbance and habitat loss of coniferous plantation woodland.	
S36	Local	Construction	Fragmentation / isolation and disturbance due to clearance.	Low negative/Minor
		Operation	Direct mortality due to RTA, fragmentation and isolation, disturbance. Habitat loss of arable/improved grassland fields, scattered scrub and occasional standard conifer trees.	Low negative/Minor
S37	Local	Construction	Fragmentation / isolation and disturbance due to clearance.	Low negative/Minor
		Operation	Direct mortality due to RTA, fragmentation and isolation, disturbance and habitat loss of improved/semi-improved grassland, mixed standard trees, and coniferous plantation.	Medium negative/Minor

HA	Evaluation	Phase	Description of Impacts	Impact Magnitude / Significance
S38	Local	Construction	Fragmentation / isolation and disturbance during construction.	Low negative/Minor
			Potential for pollution of a field drain which runs into Beans Burn due to accidental spills.	Medium negative/Minor
		Operation	Direct mortality due to RTA, fragmentation and isolation, disturbance and habitat loss of improved grassland, arable fields and a section of a species poor hedgerow.	Medium negative/Minor
			Potential for pollution of a field drain which runs into Beans Burn due to runoff.	Medium negative/Minor
S39	County	Construction	Fragmentation / isolation and disturbance due to clearance.	Low negative/Minor
		Operation	Direct mortality due to RTA, fragmentation, isolation, disturbance and habitat loss of semi-improved acid grassland and scattered scrub.	
Section SL5				
S40	Local	Construction	Fragmentation / isolation and disturbance during construction.	Low negative/Minor
			Potential for pollution of Gairn Burn and Upper Beanshill Burn due to accidental spills.	Medium negative/Minor
		Operation	Direct mortality due to RTA, fragmentation and isolation, disturbance, habitat loss of improved grassland, marshy grassland, scattered scrub and occasional standard conifer trees.	Medium negative/Minor
			Potential for pollution OF Gairn Burn and Upper Beanshill Burn due to accidental spills.	
S42	County	Construction	Fragmentation / isolation and disturbance during construction.	Low negative/Minor
			Potential for pollution of Gairn Burn and field drains feeding the Upper Beanshill Burn due to accidental spills.	Medium negative/Moderate
		Operation	Direct mortality through RTA, fragmentation and isolation, disturbance and habitat loss of marshy grassland, semi-improved grassland and dense scrub.	Low negative/Minor
			Potential for pollution of Gairn Burn and field drains feeding the Upper Beanshill Burn due to runoff.	Medium negative/Moderate
S43	Local	Construction	Disturbance only.	Negligible/Negligible
		Operation	Disturbance and habitat loss of scattered scrub conifer and mixed plantation.	Low negative/Minor
S44	Local	Construction	Fragmentation / isolation and disturbance during construction.	Low negative/Minor
			Potential for pollution of the Auchlea Moss drainage system via accidental spills.	Medium negative/Minor
		Operation	Direct mortality due to RTAs, fragmentation and isolation, disturbance and habitat loss of arable fields, improved grassland, scattered scrub some standard conifers and a small area of mixed plantation.	
			Potential for pollution of the Auchlea Moss drainage system via runoff.	
Section SL6				
S46	County	Construction	Fragmentation / isolation and disturbance due to clearance.	Low negative/Minor
			Potential for pollution of Westholme Burn due to accidental spills.	Medium Negative/Moderate

HA	Evaluation	Phase	Description of Impacts	Impact Magnitude / Significance
		Operation	Direct mortality due to RTA, fragmentation and isolation, disturbance and habitat loss of semi-improved grassland, improved grassland, scattered scrub and tall ruderal.	
			Potential for pollution to Westholme Burn due to runoff.	
S47	Local	Construction	Fragmentation / isolation and disturbance due to clearance.	Low negative/Minor
		Operation	Direct mortality through RTA, fragmentation and isolation, disturbance and habitat loss of broad-leaved woodland.	
S48	County	Construction	Fragmentation / isolation and disturbance due to clearance.	Low negative/Minor
		Operation	Direct mortality through RTA, fragmentation and isolation, disturbance and habitat loss of mesotrophic semi-improved grassland, improved grassland, mixed plantation woodland and scattered scrub.	

6 Mitigation

6.1 Introduction

6.1.1 An Environmental Management Plan (EMP) will be produced prior to construction. The purpose of the EMP will be to specify when and how the required mitigation will be implemented. Table 18 presents mitigation measures to reduce potential impacts within each Habitat Area during construction and operation of the proposed scheme. The application of mitigation follows a hierarchy, which comprises prevention/avoidance, reduction and offset/compensation measures. In addition, an Ecological Clerk of Works (ECoW) will be on site during construction to ensure all mitigation measures are implemented.

6.1.2 Table 26 presents a suite of mitigation measures to address potential impacts during construction and operation of the proposed scheme. Measures for WCA1i bird species are highlighted in bold.

Table 26 − Mitigation Measures for Construction and Operation

Mitigation Type	Impact	Description of Mitigation
Construction		
Prevent	Direct Mortality Disturbance	**Barn Owl (WCA1i species)** **All buildings (in particular farm or other vacant structures with open access) that need to be demolished prior to construction will be checked at least one year in advance of construction to ensure that they are not in use by barn owl. The structure should be destroyed immediately after survey providing that barn owl is not present. The building should be secured to prevent access should demolition not be feasible before construction.**
Prevent	Direct Mortality Disturbance	**Kingfisher (WCA1i species)** **A pre-construction survey of all suitable watercourses will be undertaken at least one breeding season in advance of construction. This will follow the methods outlined by Gilbert et al. (1998) to confirm the potential presence of kingfisher.** **Should the presence of kingfisher be confirmed, any river or stream bank that is likely to be directly affected by works that exhibits potential roosting habitat for kingfisher is subject to two options. It must either be destroyed, (only if strictly necessary and under supervision of the ecological clerk of works), or securely covered (which ever is applicable) in advance of construction, in order to prevent access by kingfishers. Once construction of the proposed scheme is completed, all protective covering must be removed.** **Any suitable kingfisher river or stream bank habitat that is not directly impacted (but is likely to be disturbed) during construction should be securely covered. Again only under the supervision of the ecological clerk of works, and in advance of construction in order to prevent access by kingfishers. Once construction of the proposed scheme is completed, all protective covering must be removed.** **It should be noted that the above mitigation measure cannot be undertaken without taking into consideration indirect impacts (disturbance and pollution) to other ecology, for example, protected mammal species such as otter and freshwater ecology, for example, fish.**
Prevent	Direct Mortality Habitat Loss Disturbance	**Plant and personnel should be restricted to a prescribed working corridor through the use of temporary barriers. This will minimise damage to habitats and potential direct mortality and disturbance to wintering birds located within and adjacent to the proposed scheme working corridor.**
Prevent	Habitat Loss Disturbance	**Works compounds, storage sites and access roads must not be located within 30m of areas of woodland, wetland and scrub to prevent damage of habitats and disturbance of wintering birds.**
Prevent	Disturbance Pollution	**Ensure that any lighting associated with construction, during low light levels and/or night, is minimised as far as practical by the adoption of best working practices associated with the use of artificial light.**

Mitigation Type	Impact	Description of Mitigation
Prevent	Pollution	**Strict adherence to SEPA pollution prevention guidelines PPG1, PPG2 and PPG6.**
Prevent	Pollution	**Minimise the amount of dust and other airborne debris produced during construction by the adoption of best working practices.**
Prevent	Pollution	**The use of approved pollution prevention schemes (e.g. oil separators) should be installed to prevent potentially polluted surface water from flowing into wetlands and/or other waterbodies.**
Reduce	Direct Mortality Disturbance	**Construction activities such as blasting, piling, grouting or any other activity likely to result in significant disturbance to wintering birds must (as far as practical) be undertaken outside sensitive periods of the day. in particular, dusk and dawn. Where it is not possible to sympathetically time works, consideration should be given to avoiding works near habitats identified by the Ecological Clerk of Works as being of high value / sensitivity for wintering birds.**
Operation		
Prevent	Direct Morality	**Where the alignment passes through existing areas of established woodland, potential RTAs should be prevented by removing or significantly thinning all trees within 5m of the road. Exceptions will be made for trees which are considered to be of significant ecological value (i.e. mature oak, wych elm or ash).**
Prevent	Direct Morality	**A bird hazard management plan (BHMP) should be produced in consultation with Aberdeen Airport and the British Airports Authority (BAA). This will ensure that ecological and landscape mitigation is compatible with the operation of Aberdeen Airport in terms of aircraft and passenger safety. The management plan will ensure that there is no increase in the hazard posed by birds as a result of ecological and landscape mitigation planting. It should be noted that as part of this BHMP, berried shrubs or trees may be avoided within 2km of Aberdeen Airport and/or along the alignment of aircraft flight paths.**
Prevent	Disturbance Pollution	**Roadside lighting throughout the proposed scheme will be strategically sited only where strictly necessary (e.g. major junctions). This will ensure that it complies with guidelines / guidance produced by the Environment Agency (http://www.environment-agency.gov.uk/yourenv/eff/pollution/) and Institute of Lighting Engineers (http://www.ile.org.uk/lighting_technical.htm) concerning the reduction of unnecessary light pollution within urban and rural areas. In particular the requirement for fitting all lights with shades and ensuring that lighting only illuminates chosen areas.**
Prevent	Direct Mortality Habitat Loss Disturbance	**Kingfisher (WCA1i species)** **Any sand and/or gravel bank/s within 500m of the proposed scheme should be surveyed for potential kingfisher roosting habitat in advance of any operational habitat management and/or maintenance. This should follow the methodology outlined by Gilbert et al. (1998). Works cannot be undertaken if occupied roosting habitat is confirmed. If suitable habitat is identified, the banks should be securely covered in advance of any management in order to prevent access by kingfishers.**
Prevent	Direct Mortality Habitat Loss Disturbance	**Operational maintenance of areas of woodland, scrub and/or grassland is minimised as far as practical.**
Reduce	Direct Mortality	**Landscape planting (including berry / fruit bearing trees and shrubs) at all junctions (regardless of size), embankments, or any point of the proposed scheme that is below vehicle height will be not be planted within 5m of the carriageway to ensure that potential RTAs are minimised as far as practical.** **Use of temporary fencing (prior to the development of the planting) will be considered where appropriate to reduce the risk of RTA for species of particular sensitivity (e.g. barn owl).**
Reduce	Direct Mortality	**A grassland verge (approximately 5m in width) should be maintained between the edge of the hard shoulder and any areas of scrub or woodland. This will ensure that bird species can easily see any on-coming vehicles before they attempt to cross the proposed scheme.**

Mitigation Type	Impact	Description of Mitigation
Offset	Habitat Loss	**Barn owl (WCA1i species)** **Replacement boxes suitable for roosting should be provided in suitable adjacent buildings/habitat (subject to consultation and verification with SNH) in the event that they are identified in buildings that need to be demolished prior to construction of the proposed scheme.**
Offset	Habitat Loss	**Additional planting within and adjacent to existing areas of woodland/scrub. This will comprise native scrub and tree species thereby creating additional wintering foraging bird habitat and compensating for habitat clearance, fragmentation and isolation and disturbance impacts.** **Habitat creation should include areas of core woodland (>30 m from woodland edge) and areas located at least 50m from route alignment.**
Offset	Habitat Loss	**Appropriate management of existing boundary habitats such as hedgerows or rough edges. This will benefit of key farmland species of conservation concern such as yellowhammer, skylark, linnet, tree sparrow, meadow pipit and grey partridge.**
Offset	Habitat Loss	**Appropriate habitat management of existing woodland/scrub habitats by selective thinning to create open glades. In addition, additional planting of native broad-leaved species to enhance existing woodland/scrub habitat and compensate for habitat lost to the scheme thereby creating a habitat structure of greater value to wintering birds.**
Offset	Habitat Loss Fragmentation Disturbance	**Kingfisher (WCA1i species)** **Where a pre-construction survey of all suitable watercourses (undertaken in advance of construction following methods outlined by Gilbert et al (1998) confirms the presence of kingfisher, replacement roosting habitat in the form of sand and/or gravel banks should be created in order to compensate for any habitat loss. This will be carried out during construction and should be sited as close to the location where the original habitat was lost (taking into account disturbance impacts associated with operation of the proposed scheme).** **Habitat loss will be identified and quantified in the course of a pre-construction survey.**
Offset	Habitat Loss Fragmentation	**Vegetated strips, wildlife overbridges or similar should be created to offset the loss of wildlife corridors (e.g. woodland, scrub, rivers, streams or disused railways etc) severed by the proposed scheme. These should be planted with native shrub and/or tree species to facilitate the movement of bird species along the severed corridors either above or below the alignment.**
Offset	Fragmentation Disturbance	**Planting of dense native tree and scrub species (>25m from the carriageway) to screen noise and vibration disturbance associated with operation of the proposed scheme from birds located within adjacent habitats. The screening must ensure that noise levels are maintained less than 40dBA on the side opposite to the carriageway.**
Offset	-	**An Environmental management Plan (EMP) will be prepared in consultation with SNH and should be followed throughout operation of the proposed scheme.**

6.2 Specific Mitigation

6.2.1 The current mitigation proposals do not include any scope to mitigate for the large scale loss of ecologically valuable farmland (arable, improved, poor semi-improved and semi-improved grassland fields). These areas are likely to provide foraging opportunities (to a greater or lesser degree) for populations of the following key bird species: barn owl, curlew, grey partridge, lapwing, linnet, meadow pipit, oystercatcher, skylark and yellowhammer as well as populations of wintering waders, wildfowl and geese.

Section SL1

6.2.2 Barn owl and kingfisher were recorded at Loirston Loch. Mitigation for barn owl and kingfisher (both WCA1i species) as outlined in Table 26 must therefore be implemented throughout Section SL1.A

description of mitigation measures to prevent, reduce and/or off-set potential impacts, together with a description and assessment of residual impacts is provided in Table 27.

Section SL2

6.2.3 A description of mitigation measures to prevent, reduce and/or off-set potential impacts, together with a description and assessment of residual impacts is provided in Table 27.

Section SL3

6.2.4 Although none were recorded in this area during the surveys, the habitats within the River Dee are considered suitable for kingfisher. Mitigation for kingfisher (a WCA1i species) as outlined in Table 26 must therefore be implemented throughout Section SL3.

6.2.5 A description of mitigation measures to prevent, reduce and/or off-set potential impacts, together with a description and assessment of residual impacts is provided in Table 27.

Section SL4 - Section SL6

6.2.6 A description of mitigation measures to prevent, reduce and/or off-set potential impacts, together with a description and assessment of residual impacts is provided in Table 27.

Table 27 – Mitigation and Residual Impacts

HA	Evaluation	Phase	Description of Impacts	Impact Magnitude / Significance	Mitigation	Residual Impacts
Section SL1						
S1	Local	Construction	Disturbance due to clearance	Low negative/Minor	As detailed in the Mitigation Measures Table 26	Negligible
		Operation	Direct mortality through RTA. Disturbance and habitat loss of broad-leaved plantation.		As detailed in the Mitigation Measures Table 26 Habitat creation Mixed woodland to the north of the proposed scheme in HA S3 from ch206820 - 206920 (Figure 26.5a).	
S2	Local	Construction	Fragmentation and isolation, disturbance due to clearance.	Low negative/Minor	As detailed in the Mitigation Measures Table 26 apart from habitat loss.	Negligible
		Operation	Direct mortality due to RTA. Fragmentation and isolation, habitat loss of improved grassland, marshy grassland, scattered scrub, occasional standard trees and mixed plantation.			
S3	Local	Construction	Fragmentation, isolation, disturbance due to clearance.	Low negative/Minor	As detailed in the Mitigation Measures Table 26	Negligible
		Operation	Direct mortality due to RTA. Fragmentation, isolation, habitat loss of coniferous plantation, broad-leaved standard trees, semi-improved neutral grassland and Greenhowe Pond.	Medium negative/Minor	As detailed in the Mitigation Measures Table 26 Habitat creation Mixed woodland to the north of the proposed scheme in HA S3 from ch206100 - 206350 (Figure 26.5a). New pond with riparian woodland north of the proposed scheme in S3 at ch206240 (Figure 26.5a).	Low negative/Minor adverse
S5	Local	Construction	Disturbance due to clearance.	Negligible/Negligible	As detailed in the Mitigation Measures Table 26	Negligible
		Operation	Direct mortality due to RTA and disturbance. Habitat loss of arable land and improved grassland.			

HA	Evaluation	Phase	Description of Impacts	Impact Magnitude / Significance	Mitigation	Residual Impacts
S6	County	Construction	Fragmentation and isolation, disturbance.	Medium negative/Moderate	As detailed in the Mitigation Measures Table 26 apart from habitat loss.	Low negative/Minor adverse
			Potential for pollution of Loirston Burn/Loirston Loch due to accidental spills.			Negligible
		Operation	Direct mortality due to RTA. Fragmentation and isolation, Habitat loss of coniferous plantation.			Low negative/Minor adverse
			Potential for pollution of Loirston Burn/Loirston Loch.			Negligible
S7	Local	Construction	Fragmentation and isolation, disturbance due to clearance.	Low negative/Minor	As detailed in the Mitigation Measures Table 26	Negligible
			Potential for pollution of Greenhowe Ditch due to accidental spills.	Medium negative/Minor	As detailed in the Mitigation Measures Table 26	Negligible
		Operation	Direct mortality due to RTA. Fragmentation and isolation, habitat loss of dense pine plantation.	Low negative/Minor	As detailed in the Mitigation Measures Table 26. Habitat creation Pine woodland to the south of the proposed scheme in HA S7 at ch205330 (Figure 26.5c).	Negligible
			Potential for pollution of Greenhowe Ditch due to runoff.	Medium negative/Minor	As detailed in the Mitigation Measures Table 26	Negligible
S8	Local	Construction	Fragmentation and isolation, disturbance due to clearance.	Low negative/Minor	As detailed in the Mitigation Measures Table 26 apart from habitat loss.	Negligible
		Operation	Direct mortality due to RTA. Fragmentation and isolation, habitat loss of improved, poor semi-improved and arable fields.	Medium negative/Minor		Low negative/Minor adverse
S9	Local	Construction	Disturbance due to clearance.	Negligible/Negligible	As detailed in the Mitigation Measures Table 26	Negligible
		Operation	Disturbance.			
S10	County	Construction	Disturbance due to clearance.	Negligible/Negligible	As detailed in the Mitigation Measures Table 26 Habitat enhancement The existing bog is to be enhanced as part of the proposals. To be agreed subject to consultation with SNH	Negligible
			Potential for pollution of the Burn of Ardoe due to accidental spills.	Medium negative/Moderate		
		Operation	Direct mortality due to RTA, disturbance. Habitat loss of wet modified bog.	Low negative/Minor		Low negative/Minor
			Potential for pollution of the Burn of Ardoe due to runoff.	Medium negative/Moderate		Negligible

HA	Evaluation	Phase	Description of Impacts	Impact Magnitude / Significance	Mitigation	Residual Impacts
Section SL2						
S11	Local	Construction/Operation	Disturbance.	Negligible/Negligible	As detailed in the Mitigation Measures Table 26	Negligible
S13	County	Construction	Direct mortality due to RTA. Fragmentation and isolation, disturbance due to clearance.	Low negative/Minor	As detailed in the Mitigation Measures Table 26	Negligible
			Potential for pollution of Heathfield Burn and Bishopston Ditch due to accidental spills.	Medium negative/Moderate		
		Operation	Direct mortality through RTA, isolation, fragmentation, habitat loss of improved, semi-improved grassland with occasional broad-leaved copses and marshy grassland.	Medium negative/Moderate	As detailed in the Mitigation Measures Table 26 Habitat creation: Mixed woodland to the north of the proposed scheme in HA S14 and S16 at ch202570 (Figure 26.5d) and ch201130 (Figure 26.5e).	Low negative/Minor
			Potential for pollution of the Heathfield Burn and Bishopston Ditch due to runoff.		As detailed in the Mitigation Measures Table 26	Negligible
S14	Local	Construction	Disturbance due to clearance.	Negligible/Negligible	As detailed in the Mitigation Measures Table 26	Negligible
		Operation	Direct mortality due to RTA. Disturbance. Habitat loss of dense scrub.	Low negative/Minor		
S16	County	Construction	Fragmentation and isolation, disturbance due to clearance.	Low negative/Minor	As detailed in the Mitigation Measures Table 26	Negligible
			Potential for pollution of the Whitestone Burn due to accidental spills.	Medium negative/Moderate		
		Operation	Direct mortality due to RTA. Fragmentation and isolation, disturbance. Habitat loss of improved grassland, marshy grassland, dense/continuous scrub and occasional broad-leaved standard trees.		As detailed in the Mitigation Measures Table 26 Habitat creation New standard broad-leaved tree planting to the north of the proposed scheme in HA 16 at ch201320 (Figure 26.5f).	Low negative/Minor
			Potential for pollution of the Whitestone Burn due to runoff.		Generic mitigation (Table 26).	Negligible
Section SL3						
S17	County	Construction	Fragmentation and isolation, disturbance due to clearance.	Low negative/Minor	As detailed in the Mitigation Measures Table 26	Negligible
		Operation	Direct mortality due to RTA. Fragmentation and isolation, disturbance. Habitat loss of improved grassland and occasional broad-leaved trees.		As detailed in the Mitigation Measures Table 26 Habitat creation:	

HA	Evaluation	Phase	Description of Impacts	Impact Magnitude / Significance	Mitigation	Residual Impacts
					New standard broad-leaved tree planting to the north of the proposed scheme in HA 16 at ch201320 (Figure 26.5f).	
S19	Local	Construction	Potential for pollution of the Burnhead Burn and Blaikiewell Burn due to accidental spills, fragmentation and isolation, disturbance due to clearance.	Medium negative/Minor	As detailed in the Mitigation Measures Table 26 apart from habitat loss.	Negligible
		Operation	Habitat loss of semi-improved grassland, arable, scattered scrub, and sections of native species rich hedgerows interspersed with trees.			Low negative/Minor adverse
			Potential for pollution of the Burnhead Burn and the Blaikiewell Burn due to runoff, direct mortality through RTA, fragmentation and isolation, disturbance.			Negligible
S20	County	Construction	Fragmentation and isolation, disturbance due to clearance.	Low negative/Minor	As detailed in the Mitigation Measures Table 26.	Negligible
		Operation	Direct mortality due to RTA, fragmentation and isolation, disturbance. Habitat loss of coniferous plantation woodland.		As detailed in the Mitigation Measures Table 26 Habitat creation Restocking of forestry commission land to the south of the proposed scheme in HA S14 at ch202220 (Figure 26.5e).	
S22	Local	Construction	Fragmentation and isolation, disturbance due to clearance.	Low negative/Minor	As detailed in the Mitigation Measures Table 26 apart from habitat loss. Habitat creation Riparian woodland planting to the east of the proposed scheme in HA 22 at ch100150 (Figure 26.5g)	Negligible
			Potential for pollution of the Blakiewell Burn and the Crynoch Burn due to accidental spills.	Medium negative/Minor		
		Operation	Direct mortality through RTA. Fragmentation and isolation and habitat loss of riparian woodland.	Low negative/Minor		
			Potential for pollution of the Blakiewell Burn the Crynoch Burn due to runoff.	Medium negative/Minor		
S23	Local	Construction	Fragmentation and isolation, disturbance due to clearance.	Low negative/Minor	Generic mitigation (Table 26).	Negligible
		Operation	Direct mortality due to RTA. Fragmentation and isolation and habitat loss of improved, semi-improved grassland and occasional broad-leaved trees.	Low negative/Minor	As detailed in the Mitigation Measures Table 26 Habitat creation New standard broad-leaved	

HA	Evaluation	Phase	Description of Impacts	Impact Magnitude / Significance	Mitigation	Residual Impacts
					tree planting to the east and west of the proposed scheme in HA 23 at ch100960 (Figure 26.5g).	
S24	Local	Construction	Fragmentation and isolation, disturbance during construction.	Low negative/Minor	As detailed in the Mitigation Measures Table 26.	Negligible
			Potential for pollution of the Kingcausie Burn and the Crynoch Burn due to accidental spills.	Medium negative/Minor		
		Operation	Direct mortality through RTA. Fragmentation and isolation, habitat loss of broad-leaved woodland, standard broad-leaved trees and improved grassland.		As detailed in the Mitigation Measures Table 26 Habitat creation Broad-leaved woodland to the east of the proposed scheme in HA S20 at ch100380 (Figure 26.5g)	
			Potential for pollution of the Kingcausie Burn and the Crynoch Burn due to runoff.		As detailed in the Mitigation Measures Table 26	
S27	Local	Construction	Fragmentation and isolation, disturbance due to clearance.	Low negative/Minor	As detailed in the Mitigation Measures Table 26 apart from habitat loss.	Negligible
			Potential for pollution of the River Dee due to accidental spills.	Medium negative/Minor		
		Operation	Direct mortality due to RTA. Fragmentation and isolation. Loss of improved and neutral semi-improved grassland.	Low negative/Minor		
			Potential for pollution of the River Dee due to runoff.	Medium negative/Minor		
S28	County	Construction	Fragmentation and isolation, disturbance during construction.	Low negative/Minor	As detailed in the Mitigation Measures Table 26 The River Dee is considered, based on professional judgement, to offer suitable nesting and foraging habitat for kingfisher (a WCA1i species). Despite not being recorded in this area by the surveys, all pertinent generic mitigation for kingfisher (as outlined in Table 26) must be implemented.	Negligible
			Potential for pollution of the River Dee due to accidental spills.	Medium negative/Moderate		
		Operation	Direct mortality through RTA. Fragmentation and isolation, disturbance. Habitat loss of riverine habitats.	Low negative/Minor		
			Potential for pollution of the River Dee due to runoff.	Medium negative/Moderate		
S29	Local	Construction	Fragmentation and isolation, disturbance due to construction.	Low negative/Minor	As detailed in the Mitigation Measures Table 26 apart from habitat loss.	Negligible
			Potential for pollution of the Mill Timber Burn and the River Dee due to accidental spills.	Medium negative/Minor		
		Operation	Direct mortality due to RTA. Fragmentation and isolation, disturbance. Habitat loss of arable and improved grassland.			Low negative/Minor adverse

HA	Evaluation	Phase	Description of Impacts	Impact Magnitude / Significance	Mitigation	Residual Impacts
			Potential pollution of the Mill Timber Burn and the River Dee due to runoff.			Negligible
S31	Local	Construction	Fragmentation and isolation, disturbance due to clearance.	Low negative/Minor	As detailed in the Mitigation Measures Table 26	Negligible
		Operation	Direct mortality due to RTA. Fragmentation and isolation, disturbance. Habitat loss of broad-leaved woodland.	Low negative/Minor	As detailed in the Mitigation Measures Table 26 Habitat creation Broad-leaved woodland to the east of the proposed scheme in HA S29 at ch102680 (Figure 26.5i)	
Section SL4						
S32	Local	Construction	Fragmentation and isolation and disturbance due to construction.	Low negative/Minor	As detailed in the Mitigation Measures Table 26 apart from habitat loss. Habitat creation New standard broad-leaved tree planting to the east of the proposed layout in HA S32 at ch103800 (Figure 26.5i).	Negligible
			Potential for pollution of the Culter House Burn due to accidental spills.	Medium negative/Minor		
		Operation	Fragmentation and isolation, disturbance. Habitat loss of buildings and hardstanding, amenity grassland, standard broad-leaved trees and bare ground.	Medium negative/Minor		
			Potential for pollution of the Culter House Burn due to runoff.			
S34	Local	Construction	Disturbance due to clearance.	Low negative/Minor	Generic mitigation (Table 26).	Negligible
		Operation	Direct mortality due to RTA, disturbance. Habitat loss of coniferous plantation woodland.		Generic mitigation (Table 26). Habitat creation Coniferous woodland to the west of the proposed scheme in HA S39 at ch105530 (Figure 26.5k)	
S36	Local	Construction	Fragmentation and isolation, disturbance due to clearance.	Low negative/Minor	As detailed in the Mitigation Measures Table 26	Negligible
		Operation	Direct mortality due to RTA. Fragmentation and isolation, disturbance. Habitat loss of arable/improved grassland fields, scattered scrub and occasional standard conifer trees.	Low negative/Minor	As detailed in the Mitigation Measures Table 26 Habitat creation New standard tree planting to the east of the proposed scheme in HA S36 at	

HA	Evaluation	Phase	Description of Impacts	Impact Magnitude / Significance	Mitigation	Residual Impacts
					ch105710 (Figure 26.5j)	
S37	Local	Construction	Fragmentation and isolation, disturbance due to clearance.	Low negative/Minor	Mitigation Measures Table 26	Negligible
		Operation	Direct mortality due to RTA. Fragmentation and isolation, disturbance. Habitat loss of improved/semi-improved grassland, mixed standard trees, and coniferous plantation.	Medium negative/Minor	Generic mitigation (Table 26). Habitat creation Mixed woodland and standard tree planting to the east of the proposed scheme in HA S36 at ch105760 - 105890 (Figure 26.5k).	
S38	Local	Construction	Fragmentation and isolation, disturbance during construction.	Low negative/Minor	As detailed in the Mitigation Measures Table 26 apart from habitat loss.	Negligible
			Potential for pollution of a field drain which runs into Beans Burn due to accidental spills.	Medium negative/Minor		
		Operation	Direct mortality due to RTA. Fragmentation and isolation, habitat loss of improved grassland, arable fields and a section of a species poor hedgerow.	Low negative/Minor		Low negative/Minor adverse
			Potential for pollution of a field drain which runs into Beans Burn due to runoff.	Medium negative/Minor		Negligible
S39	County	Construction	Fragmentation and isolation, disturbance due to clearance.	Low negative/Minor	As detailed in the Mitigation Measures Table 26	Negligible
		Operation	Direct mortality due to RTA, fragmentation, isolation, disturbance. Habitat loss of semi-improved acid grassland and scattered scrub.		As detailed in the Mitigation Measures Table 26 Habitat creation Scrub planting to the east of the proposed scheme in HA S39 at ch105625 (Figure 26.5k).	
Section SL5						
S40	Local	Construction	Fragmentation and isolation, disturbance during construction.	Low negative/Minor	As detailed in the Mitigation Measures Table 26	Negligible
			Potential for pollution of Gairn Burn and Upper Beanshill Burn due to accidental spills.	Medium negative/Minor		
		Operation	Direct mortality due to RTA, fragmentation and isolation. Habitat loss improved grassland, marshy grassland, scattered ~~scrub and occasional standard conifer trees.~~		As detailed in the Mitigation Measures Table 26 ~~Habitat creation~~ Riparian scrub and mixed	

HA	Evaluation	Phase	Description of Impacts	Impact Magnitude / Significance	Mitigation	Residual Impacts
					woodland planting to the east and west of the proposed scheme in HA S40 at ch106010 (Figure 26.5l).	
			Potential for pollution OF Gairn Burn and Upper Beanshill Burn due to accidental spills.		As detailed in the Mitigation Measures Table 26	
S42	County	Construction	Fragmentation and isolation, disturbance during construction.	Low negative/Minor	As detailed in the Mitigation Measures Table 26	Negligible
			Potential for pollution of Gairn Burn and field drains feeding the Upper Beanshill Burn due to accidental spillages.	Medium negative/Moderate		
		Operation	Direct mortality through RTA. fragmentation and isolation, disturbance, habitat loss of marshy grassland, semi-improved grassland and dense scrub.	Low negative/Minor	As detailed in the Mitigation Measures Table 26 Habitat creation Riparian scrub planting to the west of the proposed scheme in HA S42 at ch106520 (Figure 26.5l).	
			Potential for pollution of Gairn Burn and field drains feeding the Upper Beanshill Burn due to runoff.	Medium negative/Moderate		
S43	Local	Construction	Disturbance.	Negligible/Negligible	As detailed in the Mitigation Measures Table 26 apart from habitat loss.	Negligible
		Operation	Disturbance. Habitat loss of scattered scrub conifer and mixed plantation.	Low negative/Minor		Low negative/Minor adverse
S44	Local	Construction	Fragmentation and isolation, disturbance during construction.	Low negative/Minor	As detailed in the Mitigation Measures Table 26	Negligible
			Potential for pollution of the Auchlea Moss drainage system via accidental spills.	Medium negative/Minor		
		Operation	Fragmentation and isolation, disturbance. Habitat loss of arable fields, improved grassland, scattered scrub some standard conifers and a small area of mixed plantation.		Generic mitigation (Table 26) apart from loss of farmland. Habitat creation Scrub and standard tree planting to the east and west of the proposed scheme in HA S42 and 44 at ch106520, 107450, 107540 and 108100 (Figure 26.5l and Figure 26.5m).	Low negative/Minor adverse
			Potential for pollution of the Auchlea Moss drainage system via runoff.		As detailed in the Mitigation Measures Table 26	

HA	Evaluation	Phase	Description of Impacts	Impact Magnitude / Significance	Mitigation	Residual Impacts
Section SL6						
S46	County	Construction	Fragmentation and isolation, disturbance due to clearance.	Low negative/Minor	As detailed in the Mitigation Measures Table 26	Negligible
			Potential for pollution to Westholme Burn via accidental spills.	Medium negative/Moderate		
		Operation	Direct mortality due to RTA, fragmentation and isolation, disturbance. Habitat loss of semi-improved grassland, improved grassland, scattered scrub and tall ruderal.	Medium negative/Moderate	Generic mitigation (Table 26). Habitat creation Mixed woodland and scrub planting to the east of the proposed scheme in HA S46 at ch109400 (Figure 26.5o).	Low negative/Minor adverse
			Potential for pollution of Westholme Burn due to runoff.		As detailed in the Mitigation Measures Table 26	Negligible
S47	Local	Construction	Fragmentation and isolation, disturbance due to clearance.	Low negative/Minor	As detailed in the Mitigation Measures Table 26	Negligible
		Operation	Direct mortality through RTA, fragmentation and isolation, disturbance. Habitat loss of broad-leaved woodland.		As detailed in the Mitigation Measures Table 26 Habitat creation Mixed woodland and scrub planting to the east of the proposed scheme in HA S46 at ch109400 (Figure 26.5o).	
S48	County	Construction	Fragmentation and isolation, disturbance due to clearance.	Low negative/Minor	As detailed in the Mitigation Measures Table 26	Negligible
		Operation	Direct mortality through RTA, fragmentation and isolation, disturbance habitat loss of mesotrophic semi-improved grassland, improved grassland, mixed plantation woodland and scattered scrub.		As detailed in the Mitigation Measures Table 26 Habitat creation Mixed woodland and scrub planting to the east and west of the proposed scheme in HA S48 at ch109770 and 109810 (Figure 26.5o).	

Further Work

6.2.7 It will be the responsibility of the contractor to appoint an Ecological Clerk of Works, whose primary role will be to ensure the implementation of all recommended mitigation measures during construction and operation of the proposed scheme.

7 Residual Impacts

7.1.1 This section of the report provides an assessment of residual impacts in accordance with the mitigation measures proposed in Section 6.

Section SL1

7.1.2 Predicted impacts of Low Negative magnitude and Minor Adverse significance in this section on wintering birds remain in areas surrounding Greenhowe Woods and Duffs Hill (S3, S6 and S8). Residual impacts are predicted due to the loss of an existing pond (which will be replaced), temporary fragmentation and disturbance during construction; and from the risk of potential direct mortality from RTAs, fragmentation / isolation and habitat loss during operation.

Section SL2

7.1.3 Predicted impacts of Low Negative magnitude and Minor Adverse significance in this section on wintering birds remain in areas surrounding Whitstone Burn (S13 and S16). Residual impacts are predicted due to the risk of potential direct mortality from RTAs, fragmentation / disturbance and habitat loss during operation.

Section SL3

7.1.4 Predicted impacts of Low Negative magnitude and Minor Adverse significance in this section on wintering birds remain in areas surrounding Burnhead Burn, Kingcausie Burn and the River Dee (S19 and S29). These impacts would result from temporary fragmentation and disturbance during construction and from the risk of potential direct mortality due to RTAs, habitat loss, fragmentation and disturbance during operation.

Section SL4

7.1.5 Predicted impacts of Low Negative magnitude and Minor Adverse significance in this section on wintering birds remain in areas surrounding Beans Hill (S38). Residual impacts are predicted due to the risk of direct mortality from RTAs, fragmentation / isolation and habitat loss during operation.

Section SL5

7.1.6 Predicted residual impacts of Low Negative magnitude and Minor Adverse significance in this section on wintering birds remain in areas surrounding Auchlea (S43 and S44). These impacts would result from the risk of potential direct mortality due to RTAs, fragmentation / isolation, disturbance and habitat loss during operation.

Section SL6

7.1.7 Predicted residual impacts of Low Negative magnitude and Minor Adverse significance in this Section on wintering birds remain in areas surrounding Cloghill (S46). These impacts would result from the risk of direct mortality due to RTAs, fragmentation / isolation, disturbance and habitat loss during operation.

8 References

Ballard, S., & Hacker, S. (1996) Slaughter Captured in the Headlights. The Times, 6 January 1996.

Bibby, C., Burgess, N.D., Hill, D., & Mustoe, S. (2000) Bird Census Techniques – Second Edition. Academic Press, London, England.

Buckland, ST., Bell, M.V., & Picozzi, N. (Ed). (1990) The Birds of North-East Scotland. North-East Scotland Bird Club.

English Nature. (1996) The Significance of Secondary Effects from Roads and Road Transport on Nature Conservation. Peterborough, England.

English Nature (1994) Are habitat corridors conduits for animals and plants in a fragmented landscape? A review of the scientific evidence. English Nature Research Report 94. Peterborough, England.

Gilbert, G., Gibbons, D.W., & Evans, J. (1998) Bird Monitoring Methods: A Manual of Techniques for UK Key Species. The Royal Society for the protection of Birds, Sandy, Bedfordshire, England.

Highways Agency (2001) The Design Manual for Roads and Bridges. Vol 10.

Hill, D. (1992) The Impact of Noise and Artificial Light on Waterfowl Behaviour: A Review and Synthesis of Available Literature British Trust for Ornithology.

IEEM (2002) Guidelines for Ecological Impact Assessment. Institute of Ecology and Environmental Management, UK.

IEEM (2006) Draft Guidelines for Ecological Impact Assessment. Institute of Ecology and Environmental Management, UK.

Luell, B., Bekker, G.J., Cuperus, R., Dufek, J., Fry, G., Hicks, C., Hlavá˘c, V., Keller, V.B., Rosell, C., Sangwine, T., Tørsløv, N., le Maire, B., & Wandall, L. (Eds.) (2003) Wildlife and Traffic: A European Handbook for Identifying Conflicts and Designing Solutions.

North-East Scotland Bird Club (2003). North-East Scotland Bird Report 2003.

North-East Scotland Bird Club (2004). North-East Scotland Bird Report 2004.

North-East Scotland Bird Club (2005). North-East Scotland Bird Report 2005.

Outen, A. R. (undated). The Possible Ecological Implications of Artificial Lighting. Hertfordshire Environmental Records Centre.

Rattcliffe, D. A. (1977) Nature Conservation Review. Nature Conservancy council.

Rawson, H. E. A. (1932) Bird's Song in Relation to Light. Trans. Herts Natural History Society 17 1932.

Reijnen, A.J.S.M. & Thissen, T.B.M. (1987) The Effects from Road Traffic on Breeding-Bird populations in Woodland. Annual Report 1986 pp 121-132. Research Institute for Nature management. Leersum.

Reijnen, R. & Foppen, R. (1994) The Effects of Car Traffic on Breeding Bird Populations in Woodland I: Evidence of Reduced habitat Quality for Willow Warblers (Phylloscopus trochilus) Breeding Close to a Highway. Journal of Applied Ecology 31, 85-91.

Reijnen, M.J.S.M., Veenbaas, G., & Foppen, R.P.B. (1995a) The Effects of Motorway Traffic on Breeding Bird Populations. Ministry of Transport and Public Works/Directorate-General for Public Works and Water Management, Roads and Hydraulic Engineering Division/DLO-Institute for Forestry and Nature Research.

Reijnen. R. & Foppen, R. (1995b) The Effects of car Traffic on Breeding Bird populations in Woodland III: Reduction in Density in Relation to the Proximity of Main Roads. Journal of Applied Ecology, 32, 187-202.

Scottish Executive. (2004) A Strategy for the Conservation and Enhancement of Biodiversity in Scotland.

Slater, F. (1994) Wildlife Road Casualties. British Wildlife 5(4), 214-221.

The Nature Conservation (Scotland) Act 2004.
http://www.opsi.gov.uk/legislation/scotland/acts2004/20040006.htm.

Van Apeldoorn, R. (1995) Fragmented Mammals; What Does that Mean? Paper presented at the International Conference on Habitat Fragmentation, Infrastructure and the role of Ecological Engineering, MECC, Maastricht, 38-21 September 1995.

Annex 1

Species List for Wintering Birds Recorded in the Southern Leg

Species	Scientific name
barn owl	*Tyto alba*
blackbird	*Turdus merula*
black-headed gull	*Larus ridibundus*
blue tit	*Parus caeruleus*
bullfinch	*Pyrrhula pyrrhula*
buzzard	*Buteo buteo*
carrion crow	*Corvus corone*
chaffinch	*Fringilla coelebs*
coal tit	*Parus ater*
common gull	*Larus canus*
common Sandpiper	*Actitis hypoleucos*
coot	*Fulica atra*
cormorant	*Phalocrocorax carbo*
crossbill	*Loxia curvirostra*
curlew	*Numenius arquata*
dunnock	*Prunella modularis*
feral pigeon	*Columba livia*
fieldfare	*Turdus pilaris*
goldcrest	*Regulus regulus*
goldeneye	*Bucephula clangula*
goldfinch	*Carduelis carduelis*
grasshopper Warbler	*Locustella naevia*
great black-backed gull	*Larus marinus*
great tit	*Parus major*
great spotted woodpecker	*Dendrocopos major*
greenfinch	*Carduelis chloris*
grey heron	*Ardea cinerea*
grey partridge	*Perdix perdix*
grey wagtail	*Motacilla cinerea*
greylag goose	*Anser anser*
herring gull	*Larus argentatus*
house sparrow	*Passer domesticus*
jackdaw	*Corvus monedula*
jay	*Garrulus glandarius*
kestrel	*Falco tinnunculus*
kingfisher	*Alcedo atthis*
lapwing	*Vanellus vanellus*
lesser black-backed gull	*Larus fuscus*
linnet	*Carduelis cannabina*
long-tailed tit	*Aegithalos caudatus*
magpie	*Pica pica*
mallard	*Anas platyrhynchos*

Species	Scientific name
meadow pipit	*Anthus pratensis*
mistle thrush	*Turdus viscivorus*
mute swan	*Cygnus olor*
oystercatcher	*Haematopus ostralegus*
pheasant	*Phasianus colchicus*
pied wagtail	*Motacilla alba*
pink-footed goose	*Anser brachyrhynchus*
Pochard	*Aythya ferina*
redwing	*Turdus iliacus*
reed bunting	*Emberiza schoeniclus*
robin	*Erithacus rubecula*
rook	*Corvus frugilegus*
skylark	*Alauda arvensis*
snipe	*Gallinago gallinago*
song thrush	*Turdus philomelos*
sparrowhawk	*Accipiter nisus*
starling	*Sturnus vulgaris*
stock Dove	*Columba oenas*
stonechat	*Saxicola torquata*
Teal	*Anas crecca*
tree creeper	*Certhia familiaris*
tree sparrow	*Passer montanus*
tufted duck	*Aythya fuligula*
twite	*Carduelis flavirostris*
whinchat	*Saxicola rubetra*
wigeon	*Anas penelope*
woodcock	*Scolopax rusticola*
woodpigeon	*Columba palumbus*
wren	*Troglodytes troglodytes*
yellowhammer	*Emberiza citrinella*