



Appendix A25.3 – Bat Report

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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. It considers the potential impacts on bat populations associated with the Southern Leg of the proposed scheme. The results of the surveys carried out for the purpose of this assessment are also presented and are shown on Figures 25.4a-h and Figures 25.5a-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 the South Kingswells Junction (ch105900–108500); and
 - Section SL6: South Kingswells Junction to Derbeth Overhills (ch108500–111200).
- 1.1.3 All tables and figures are structured in this manner.
- 1.1.4 The Ecological Impact Assessment (EclA) 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, along with cognisance of draft Institute of Ecology and Environmental Management (IEEM) guidelines.
- 1.1.5 These studies included desk-based consultation to collate existing information about bat populations in the study area for the proposed scheme and field surveys to provide current data about the status of bat populations and the habitats that support them.

Aims

- 1.1.6 The purpose of the survey and assessment was to:
- assess the presence and status of bat populations and their habitats in the study area;
 - determine the presence of roosts and availability of potential roosts in the study area including those in trees, buildings and other man-made structures;
 - determine and assess the value of foraging and commuting habitats/features within the study area for bats;
 - assess the potential impacts of the proposed scheme on the local bat population and their habitats; and
 - identify appropriate mitigation measures and determine any residual impacts.

1.2 Background to Assessment

Biology

- 1.2.1 There are 16 species of bat (Order Chiroptera) known to be resident in the British Isles, ten of which have been recorded in Scotland (Gorman et al., 1996):
- Common pipistrelle bat (*Pipistrellus pipistrellus*);
 - Soprano pipistrelle bat (*Pipistrellus pygmaeus*);
 - Nathusius' pipistrelle bat (*Pipistrellus nathusii*);
 - Brown long-eared bat (*Plecotus auritus*);
 - Noctule bat (*Nyctalus noctula*);
 - Leisler's bat (*Nyctalus leisleri*);
 - Daubenton's bat (*Myotis daubentonii*);
 - Natterer's bat (*Myotis nattereri*);
 - Whiskered bat (*Myotis mystacinus*); and
 - Brandt's bat (*Myotis brandtii*).
- 1.2.2 Seven of these species have been recorded in Aberdeenshire (Isobel Davidson, Aberdeen Bat Group, personal communication), five of which are known to breed there: common and soprano pipistrelle, brown long-eared, Daubenton's and Natterer's bats. There have also been isolated sightings of Nathusius' pipistrelle near Aberdeen and Leisler's bats have been recorded foraging near Peterculter although the population status of the species in the region is currently unclear (Rob Raynor, SNH, personal communication). The three pipistrelle species are collectively referred to hereafter as pipistrelles although each species is known as common, soprano or Nathusius' pipistrelle.
- 1.2.3 Bats have evolved a number of behavioural, physiological and morphological features connected with their ability to fly and their nocturnal activity patterns (Kunz, 1982). British bats are entirely insectivorous and have a complex sonar system known as echolocation that enables bats to find their insect prey and navigate around their environment at night. Echolocation involves emitting a rapid series of high frequency calls and then interpreting the returning echoes to build up a picture of their surroundings.
- 1.2.4 Bats' habitat requirements vary widely both on an individual and at the species level. Certain features such as woodland edges and freshwater pools support the highest densities of insects and are therefore often focal points for foraging bats (Walsh et al., 1996a and 1996b). Of the bats found in Scotland, Natterer's and brown long-eared bats mainly forage in woodland environments whilst Daubenton's forage chiefly in areas associated with water. Pipistrelle bats are generalist in their feeding strategies and forage around waterbodies, woodlands, hedgerows and pasture (Altringham, 2003).
- 1.2.5 Linear habitat features such as rivers, hedgerows, roads and woodland edges are important to bats, which use these as landmarks in order to commute from one location to another (Schofield and Mitchell-Jones, 2003). Distances that bats travel between roosts and foraging areas are variable both within and between species. For example, brown long-eared bats may travel up to 2.8km from the roost site but spend most of their time foraging within 0.5km of the roost, whereas pipistrelles may forage up to 5.1km from the roost. Other British species may travel further than this (Entwistle et al., 1996).
- 1.2.6 Bats use different types of roosts at different times of the year and different roosts within the breeding season. Between late October and March bats hibernate. This requires an unexposed

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roost with a stable temperature, typically a cave, mine, cellar or tunnel. Around March, bats emerge from hibernacula sites and move to their summer roosts, typically within man-made structures or suitable crevices in trees. Some of these roosts are used regularly (i.e. every summer) and for substantial periods of time, whereas others serve as 'transitional roosts' being used for only one or two days every year or temporarily (e.g. for one season only). Mating takes place between late August and early December, either at the winter hibernating site or at autumn mating sites. Births occur the following summer. The numbers of bats using roosts can vary from single bats to hundreds of bats in a nursery colony or hibernation site (Altringham, 2003).

Legal and Conservation Status

- 1.2.7 All British bat species are listed on Schedule 5 to the Wildlife and Countryside Act (1981) (as amended) and protected under Section 9 of the Act. This affords bats protection against killing, injuring or taking and intentional or reckless damage, destruction or obstruction of roost sites, irrespective of occupation status. These actions all constitute offences under the Act. In Scotland, the Wildlife and Countryside Act has been amended by the Nature Conservation (Scotland) Act 2004, which extends the legal protection afforded to Schedule 5 species such as bats. By law, a roost is any structure or place used for shelter or protection. Since bats tend to reuse the same roosts, the roost is protected whether the bats are present or not. Prosecutions for unlawful killing or injuring of bats may result in a fine of up to £5000 per bat and a possible jail sentence.
- 1.2.8 The EU Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive) places a legal requirement on all Member States of the EU to protect specified species and habitats through their own domestic legislation. In the UK, the Habitats Directive has been implemented through the Conservation (Natural Habitats, and c.) Regulations 1994 (the Habitats Regulations). All species of bat are included in Annex IV of the Habitats Directive, which requires that they are given full legal protection.
- 1.2.9 All species of bat, except for the common pipistrelle, are listed on Appendix II of the Council of Europe Convention on European Wildlife and Natural Habitats (the Bern Convention 1979) to which the UK is a signatory and ensures conservation and protection of all wild plant and animal species listed and special protection to the most vulnerable or threatened. The Convention on the Conservation of Migratory Species of Wild Animals (the Bonn Convention) was adopted in 1972, came into force in 1983, and provides for the protection, through management agreements, of certain migratory species including bats, which are listed on Appendix II. The Agreement on the Conservation of Bats in Europe (EUROBATS) came into force in 1994.
- 1.2.10 Bat populations have declined considerably during the last century, with Britain's native species being subject to enormous changes in their habitats. Drainage of wetlands, woodland clearance and agricultural intensification have affected bats through loss of roosting sites and reductions in insect abundance and diversity. Recent research has suggested that the conservation status and estimated UK population sizes of the seven species occurring in Aberdeenshire are either improving, stable or show no clear trend as shown in Table 1

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Table 1 – British Bat Species Populations and Status (Source: MacDonald and Baker 2005; JNCC 2005)

Species	UK (Scotland) Population Estimate	Conservation Status	Population Trend
Brown long-eared bat	245,000 (27,500)	Not threatened	No clear trend
Natterer's bat	148,000 (17,500)	Not threatened	Increasing
Daubenton's bat	560,000 (40,000)	Not threatened – conservation concern	Increasing
Common pipistrelle	2,430,000	Not threatened – UK priority species	Increasing
Soprano pipistrelle	130,000	Not threatened – UK priority species	Stable
Nathusius' pipistrelle	16,000	Not known	Not known
Leisler's bat	28,000 (250)	Scarce, Near threatened (IUCN)	No clear trend

- 1.2.11 Any assessment of development impacts must take into account the legal obligation to ensure that declines in bat populations are avoided. In addition, any development must have regard to the targets and objectives of the Local and UK Biodiversity Action Plans (LBAP and UKBAP) for the species concerned.
- 1.2.12 *P. pipistrellus* and *P. pygmaeus* are priority species identified in the UK Biodiversity Action Plan and have a combined national Species Action Plan (Hutson, 1993; UK Biodiversity Partnership, 2005) which is in the process of being adopted by the North East Scotland Biodiversity Partnership. Pipistrelles are threatened by reduction in insect prey abundance due to agricultural intensification, loss of suitable habitat and flyways, as well as disturbance of roosts and loss of maternity/winter roost sites in buildings and trees. The UK BAP presents the following targets toward which the proposed scheme must have regard to:
- maintain the existing population of *P. pipistrellus* and *P. pygmaeus*;
 - maintain the existing geographical range of *P. pipistrellus* and *P. pygmaeus*; and
 - restore the population size of *P. pipistrellus* and *P. pygmaeus* to pre-1970 numbers
- 1.2.13 The North East Scotland Biodiversity Action Plan (BAP) contains a local Biodiversity Action Plan (LBAP) for Daubenton's bats, which serves to highlight the need to protect this locally important species (Racey, undated). Although Daubenton's bats have relatively widespread distribution across the country, they are listed as a species of conservation concern by the Biodiversity Steering Group due to threats from loss of roosts and changes in riparian vegetation and water quality. The LBAP presents a number of targets toward which the proposed scheme must contribute to:
- promote sympathetic management of habitats; and
 - maintain up to date records and information on Daubenton's bats and their habitat through monitoring.
- 1.2.14 The LBAP lists a number of management prescriptions considered necessary for the attainment of these targets, including the identification and proper management of habitat associated with roosts, the improvement of riverine management and development of bankside vegetation and riparian woodland, the erection of bat boxes to supplement natural roosts, the monitoring of bat populations and offering of advice to landowners on appropriate habitat management practices.
- 1.2.15 Although brown long-eared and Natterer's bats do not have their own Action Plans in Aberdeenshire, they are thought to be rarer than common and soprano pipistrelle and Daubenton's bats. This is particularly the case for Natterer's bat for which only a small number of roosts is

known. Nathusius' pipistrelle is also believed to be rare and no breeding colonies are known this far north (Sue Swift, University of Aberdeen, personal communication).

2 Approach and Methods

2.1 Consultation

- 2.1.1 Previous survey data and records are important to consider for any site assessment for an EIA as they often provide information on the use of a site over a longer period than individual surveys, and also form a basis for updating records of known populations.
- 2.1.2 An initial walkover survey was carried out in February 2006 to provide preliminary data on habitats and buildings that appeared to be of potential value to bats. These allowed the identification and prioritisation of areas requiring surveys and survey effort required for the summer survey season.
- 2.1.3 The Aberdeen Bat Group, North East Scotland Biological Records Centre (NESBReC), the University of Aberdeen and Scottish Natural Heritage (SNH) were approached for data regarding bats within 2km of the proposed scheme and for their advice and recommendations regarding ecological constraints and opportunities in the study area.

2.2 Survey Methods

- 2.2.1 The level of survey effort was determined through professional judgement, best practice guidelines (Mitchell-Jones, 2004) and through advice from SNH at a meeting on 8 December 2005.
- 2.2.2 Bat field surveys were undertaken using two methods: an assessment of the landscape for its potential value to roosting, foraging and commuting bats, and an evaluation of bat activity carried out at select periods of dusk, dark and dawn. Surveys were carried out by suitably trained and licensed (where appropriate) ecologists. Data were recorded onto Ordnance Survey maps and 1:10,000 scale GIS map sheets, which formed the basis for the results (Figures 25.4a-h and 25.5a-h).

Study Area

- 2.2.3 The study area for field surveys was defined with regard to specified standards (DMRB, 2001) and consideration was given to the seven species likely to be present (Isobel Davidson, Aberdeen Bat Group, personal communication; Richardson, 2000). The survey area extended 500m either side of the centreline of the road alignment giving a 1km wide study area. The size and locations of junctions were not finalised at the start of the survey season therefore not all land within 500m of the outer edge of these junctions is incorporated in the study area (see Section 2.6). Although this is narrower than the ideal width for such surveys (DMRB, 2001), the final study area and methods were agreed with SNH and preliminary surveys and desk study including information requests extended beyond 500m at these locations.
- 2.2.4 Due to difficulties in obtaining access permissions from landowners and homeowners (see Section 2.6) and the resulting impact on available time to complete the surveys, activity surveys and building surveys (i.e. potential roost sites) within 200m of the road alignment were prioritised. Consequently building and activity surveys outside 200m are being completed during the 2007 survey season (see Section 3.2 for further detail on survey coverage achieved in summer 2006). However, habitat profiling surveys were completed throughout the 1km wide survey corridor.

Habitat Profiling

- 2.2.5 Where access was permitted, all habitat features including woodlands, water features, farms, grassland, wetland, urban, linear features (walls and hedgerows), man-made structures, underground and rock outcrop features were examined and assessed for their potential value to

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foraging, commuting and roosting bats (Jenkins et al., 1998; Walsh and Harris, 1996 a and 1996b; Entwistle et al., 1997).

2.2.6 Each habitat was then assessed for its potential for roosting, foraging and commuting according to the criteria shown in Table 2.

Table 2 – Habitat Profile Assessment

Bat Habitat Value	Roosting	Foraging	Commuting
High	Woodlands: High proportion of trees with roost potential (suitable roost sites and access points in cracks, crevices and other gaps) > 1 tree in 50 with potential. Diverse choice of different roosts. Caves / tunnels / mines / ice houses with humid atmosphere and sheltered, stable temperature conditions. Low disturbance levels.	High insect abundance. Native woodland / trees / hedgerows offering shelter and diverse edge habitat, and open parkland, suitable for Leisler's bats. Slow flowing/still freshwater features with sheltered vegetated edges. Low disturbance levels from lighting, pollutants, human activity.	Continuous, unbroken linear feature providing shelter and / or foraging opportunities and connectivity with other landscape features including roost and foraging areas. Includes tree lines, woodland edge, hedgerows, waterways, walls, woodland tracks, road and drainage networks, buildings.
Medium	Roost sites and access points in cracks, crevices and gaps present but not ideal due to size, disturbance levels, exposure. Between 1 in 50 and 1 in 100 trees have roost potential.	Moderately high insect abundance. Native woodland / trees / hedgerows offering some shelter and edge habitat. Fast flowing freshwater features offering little shelter.	Partly discontinuous feature (gaps up to 30m wide) offering some shelter and/ or foraging opportunities.
Low	No suitable roost sites or access points visible. Fewer than 1 tree in 100 has roost potential due to age or type of trees. High disturbance levels.	Conifer woodland, improved agriculture and built up areas with low plant diversity and/or insect abundance. Lack of shelter, poorly connected to roost sites and commuting routes. High disturbance levels from lighting, pollutants, human activity.	Discontinuous feature (gaps greater than 30m wide) offering no shelter and/ or isolated from potential roosting and/or foraging areas.

2.2.7 Classifying structures, trees and habitat in this way allowed prioritisation for closer examination and emergence/activity surveys. The results of the habitat profile assessment also formed the basis of the evaluation of Habitat Areas. Where no bat activity was observed, the evaluation of that site was based on the habitat profile assessment (refer to Section 2.4). Areas of low/no value to bats for roosting, commuting or foraging were excluded from the assessment to make the survey time more effective, due to the size of the survey area and time/ access restrictions.

Potential Tree Roosts

2.2.8 Difficulties in obtaining permission to access land during the 2006 survey season, rendered it impractical to survey every tree for potential tree roosts within the project timescale. As such, all isolated mature broadleaved stand-alone trees were evaluated for roost potential and all wooded areas were given an overall assessment of suitability based on composite sampling of trees.

2.2.9 Trees were examined during the summer of 2006 and ongoing surveys in 2007 for signs of bats including insect remains, droppings, grease marks, urine stains, the presence of dead or live bats, smoothing or lack of cobwebs, all of which indicate the presence of bats or their resting places (Mitchell-Jones, 2004). In addition, trees were assessed for features of potential use as roosts, including loose bark, splits, cracks, woodpecker holes, knot holes and other hollows using an endoscope or binoculars where necessary. Trees were assigned a roost potential category

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according to the criteria outlined in Table 3 (which also includes categories for other types of roost structure).

Table 3 – Roost and Potential Roost Category

Main Category	Sub Category	Category description (trees)	Category Description (structures)	Indicator
1 (Roost)	A	Trees with evidence of current use by bats.	Buildings/man-made structures with evidence of current use by bats.	Sighting/hearing of bats (including emergence). Presence of fresh droppings/staining.
	B	Trees with evidence of recent use by bats.	Buildings/man-made structures with evidence of recent use by bats.	Small numbers of old droppings/old staining, smoothing and lack of cobwebs. Roosts identified by personal communication from reliable source (e.g. property owner).
2 (Potential Roost)	A	Trees with high potential for use as roost.	Buildings/man-made structures with high potential for use as roost.	Presence of gaps, cracks, loose tiles, holes in roof, loose boards and potential access points. Presence of cracks, splits, knot holes, loose bark, woodpecker holes, snag ends and other hollows etc.
	B	Trees with some potential for use as roost.	Buildings/man-made structures with some potential for use as roost.	Presence of dense ivy or other features of lower potential as roost sites. Presence of dense ivy cover or dead wood.
3 (No potential)	n/a	Trees with no or low potential for use as roost.	Buildings/man-made structures with low potential for use as roost.	No such features, isolated from foraging or commuting routes. No such features, immature, smooth bark or lack of branches. Isolated from foraging or commuting routes.

Potential Roosts in Structures and Features Other Than Trees

- 2.2.10 Daytime assessments of every structure or feature including single buildings, small groups of buildings/structures (including farm buildings), private residences, outhouses, ice-houses, bridges, culverts, memorials and walls that could be potential roosts were carried out according to the criteria in Table 3. The exception to this was in Milltimber where the number of buildings with potential as roosts was prohibitively large. An overall assessment of roost potential based on a daytime walkover survey was made in conjunction with evening activity/emergence surveys to establish the use of the buildings by bats.
- 2.2.11 Pipistrelle and brown long-eared bats are considered more likely to roost in buildings such as farmhouses, modern dwelling houses and cottages as such sites are warm enough to support roosting colonies including maternity roosts (Entwistle et al., 1997; Jenkins et al., 1998). Other species preferentially roost in other structures. For example, Natterer's bats prefer gaps in loose mortar in old barns and Daubenton's bats often roost in bridges (Mitchell-Jones, 2004).
- 2.2.12 No underground structures such as caves and mines are known to be present in the study area.

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Activity Assessment – Summer 2006

- 2.2.13 Activity surveys for the study area were carried out between June and early August 2006 using methods recommended by Mitchell-Jones and McLeish (Mitchell-Jones and McLeish, 2004).
- 2.2.14 Bat activity was assessed using a combination of visual observation and echolocation detection techniques. Bat detectors are capable of translating high frequency echolocation calls into sounds within human audible range using heterodyne techniques. Bat Box III, Pettersson D230, Stag bat boxes and Duet detectors were used for heterodyne techniques. Bat calls were interpreted by surveyors in the field. Activity data including species, location, and behaviour (including foraging, commuting, social calling) were recorded onto field maps and recording forms.
- 2.2.15 Evening emergence surveys: buildings identified as category 1a, 1b (roosts) and 2a (high potential roosts) during daytime surveys were monitored from 20 minutes before sunset and up to two hours after sunset. Emergence surveys were not carried out on category 2b roost (buildings/structures with some potential to be used as roosts) due to time constraints and it is possible that bat access points may have been missed during daytime surveys (see Section 2.5). Precise timing of emergence surveys was determined according to the onset of sunset. Surveyors were stationed adjacent to potential access points or walked slowly around the structure using hand held bat detectors to identify emerging bats. The time, species and number of bats observed emerging or carrying out other activity were recorded, along with details of direction of travel to or from the roost. A roost count/emergence survey form was completed on each visit. Due to time restrictions, only one emergence survey was carried out at each potential roost. It is important to recognise that buildings where no bats were observed emerging on the particular night still have potential to be used by bats. This could occur due to several factors, including surveyors being unable to clearly view the area where bats emerged, bats remaining inside the roost due to unfavourable weather conditions (although all emergence surveys were carried out when conditions were considered to be favourable for bat foraging activity) or the fact that the bats were not using that particular building on the night of the survey due to roost 'switching' behaviour that several bat species perform.
- 2.2.16 Activity assessments: Two methods were used to identify bat activity within the survey area: activity surveys and commuting route surveys. There were two defined time periods within which these surveys were undertaken: between sunset and three hours after dusk and in the three hours before sunrise, to avoid the well-documented lull in bat activity in between. Not all of the activity surveys were completed during the 2006 survey period and the majority of the commuting route surveys are being carried out in the 2007 survey period. Records of commuting bats were made during activity surveys and from those commuting route surveys that were completed.
- 2.2.17 The walkover activity survey was undertaken by surveyors following a pre-defined route based on the combined findings of the Stage 1 ecological assessments, daytime habitat profile surveys and wider observations of field maps and aerial photographs. They were not undertaken in areas of low habitat value (e.g. open arable farmland) aside from incidental observations or where a feature of higher value was present (e.g. large, intact hedge linking distant areas of woodland), unless the area was likely to be directly affected by the proposed scheme.
- 2.2.18 Teams of two surveyors walked at a slow speed, stopping for two minutes where bats were observed in order to sample activity, or at least every 100m. During the survey, detailed notes were made regarding species, number of bat passes (discrete bursts of bat echolocation), activity type (Foraging, Commuting, Social Calling) and specific behaviour (including direction of travel and use of features in the landscape, e.g. direction of travel, foraging over water or swarming around buildings). Bat activity surveys were undertaken at each of the potential habitat areas at least once in the survey period.
- 2.2.19 Potential commuting routes were identified during habitat profile surveys along linear features including tree lines, roads, woodland edges and watercourses. A number of commuting routes were identified as an incidental part of the activity surveys. Specific commuting route surveys

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involved a combination of manual and static bat detection techniques to identify the location, species, number and direction of bats.

- 2.2.20 The level of survey effort varied for the activity and commuting route surveys as a result of access restrictions, but also in to gain enough information on certain areas where high levels of activity were anticipated as a result of high roosting, foraging and commuting potential. Milltimber and the surrounding area were surveyed on several nights in order to gain a comprehensive picture of bat activity (including at dawn and dusk), which has resulted in what appears to be higher levels of activity. However, this also reflects the importance of this area for several species of bats as roost habitat (personal communication, Isobel Davidson, Aberdeen Bat Group). Kingcausie is another area where activity surveys overlapped due to the abundance of high value habitats and the potential presence of a number of species relatively rare over the rest of the survey area.

Survey Weather Conditions

- 2.2.21 Bats will continue to feed in poor weather conditions including mist and light rain, although they will tend to remain torpid if cold temperatures accompany this (Altringham, 2003). As a general rule the ideal conditions for surveys (most productive in terms of the body of data available) is for fine and calm conditions with little or no rain (Kunz, 1982). Surveys were carried out under the most ideal conditions available within the survey time-frame and the constraints of the project. Surveys were not carried out or were suspended in persistent rain or strong winds.

2.3 Refinement to Survey Methods

- 2.3.1 Two parts of the study area were surveyed twice: once in 2006 where the present route option overlaps with the superseded route option which was surveyed once in 2004. Daytime and evening surveys yielded only minor differences between the two survey periods which reflects the similarities in approach.
- 2.3.2 A number of changes were made to the bat survey methodology that was initially used for the for the assessment undertaken for the Northern Leg of the scheme in 2004 to incorporate recommendations made by SNH. In addition, the methods for the current assessment were refined based on study area experience gained during the 2004 surveys that were carried out for the Northern Leg.
- 2.3.3 This section outlines the differences in the methodology followed during the bat survey period in 2006 (for the Southern Leg and Fastlink study areas) and the 2004 surveys (for the Northern Leg study area). The aims of the bat surveys remained unchanged.

Study Area

- 2.3.4 Further consideration has been given, where appropriate, to important features of value to bats that extend beyond the 1km study area and that were identified in preliminary walkover surveys undertaken in early 2006. The definition of study areas for detailed daytime and evening bat surveys has otherwise remained unchanged.

Habitat Evaluation

- 2.3.5 Daytime habitat evaluation survey methods (to identify habitats of potential importance to foraging, roosting and commuting bats) remained unchanged between the 2004 and 2006 surveys.
- 2.3.6 Daytime roost assessments of trees were standardised across the 1km study area so that all woodlands were sampled and all mature broadleaved stand-alone trees were assessed for roost potential irrespective of location within the study area during the 2006 survey period. This addresses the difficulties of using increased survey effort within 50m of an alignment that was subject to potential alteration, as for the proposed Northern Leg. Standardisation of methods

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across the study area also better enabled the identification of commuting routes between roost sites and foraging areas as recommended by SNH.

- 2.3.7 The categorisation of actual and potential roosts, foraging areas and commuting routes employed during the 2006 survey period was based on the refinement of the 2004 methodology and is considered to be the most efficient method of assessing the relative value or potential value of features. Assigning a numerical category to buildings and trees based on the availability of roost opportunities rather than the likelihood of being a roost was considered to reduce ambiguity as bats are known to use buildings and trees that can appear to be unsuitable. This is due, in part, to a greater degree of uncertainty on roost site selection and the detailed habitat requirements of bats, in comparison to other groups such as birds.

Activity Surveys

- 2.3.8 To take into account the recommendation that greater effort be channelled into the assessment of fragmentation and habitat severance impacts on bats, it was agreed with SNH that separate commuting route surveys would be undertaken as part of the bat activity surveys. These data will be included in an Environmental Assessment Report to be published during 2007.
- 2.3.9 There were slight differences in the timing of bat activity surveys with respect to time of day. During the 2006 survey the timing period better reflects the periods of highest bat activity (Mitchell-Jones, 2004). The difference in the timing of activity surveys with respect to time of year between the 2004 and 2006 survey period is not considered to affect the applicability of activity survey data, as both were undertaken during the optimal survey period for bat surveys (DMRB, 2001; Mitchell-Jones, 2004).
- 2.3.10 The methods used in selection of buildings for evening emergence and dawn swarming surveys did not differ significantly between the 2004 and 2006 survey periods. Surveys undertaken during the optimal emergence/swarming times and concentrated on identification of bat roosts where impacts on bats were considered more likely.
- 2.3.11 The methodology used to identify areas of bat activity were altered to reflect the change in survey effort to identify commuting routes based on SNH recommendations. The 2004 survey method followed a transect based loosely on potential habitat areas while simultaneously identifying connecting routes between them. The 2006 surveys focused exclusively on identifying habitat areas. The identification of commuting routes between these areas of habitat has been established through studies being completed in 2007. The methodology followed in 2006 also enabled more than one repetition of each transect, which gave a better representation of how each area was used by bats.

2.4 Evaluation of Nature Conservation Value

- 2.4.1 The evaluation section aims to assign a nature conservation value to the bat populations associated with habitat areas. Evaluation of the intrinsic nature conservation value of vegetation and habitat features themselves is included in Appendix A25.1 (Terrestrial Habitats) and is discussed only where no bat activity was recorded.
- 2.4.2 The 'nature conservation value' or 'sensitivity' of a species is related to the wider importance of that species at the local, regional and national levels and is used to assess the value of discrete species populations within a given area.
- 2.4.3 All species of bats are afforded high levels of protection under the EC Habitats Directive and are classified as European Protected Species (see Section 1.2) and are therefore considered to be of international importance in terms of legislation, although the ecological value of each site for bats must take into account the relative abundance of each species (Table 1). For example common and soprano pipistrelle bats are not rare or threatened in Aberdeenshire and despite their international protected status they are common in the region. The value attributed to a feature or

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Habitat Area is considered according to whether the site is used by bats, the size of the population and what the area is used for (e.g. foraging or commuting habitat). Where bats were not detected during field surveys, the value of the habitat or area is assessed in terms of its potential to support roosting, foraging or commuting bats (potential bat areas) based on the potential value to bats (low, medium or high) according to the methods described in Section 2.2.

2.4.4 Sites deemed necessary to maintain the viability of regionally significant populations of bats including large and scarce foraging resources and large maternity roost sites or hibernacula are considered to be of national ecological value. Sites necessary for maintaining the viability of local populations in the Aberdeen area, such as small roost sites, are evaluated as being of regional ecological value. Those sites deemed to be supporting bat populations, such as important foraging habitat or commuting corridors, are evaluated as being of county ecological value. Sites with potential to support bat populations considered to appreciably enrich the habitat resource within the local context are evaluated as being of local ecological value (see Table 4).

2.4.5 In addition, consideration has also been given to any conservation designations, desk study results and a review of available literature. The criteria used in the evaluation of features are based on the Ratcliffe Criteria (Ratcliffe, 1977) used in the selection of biological Sites of Special Scientific Interest (SSSI). Sites and features have been classified according to the general criteria identified in Table 4.

Table 4 – Evaluation of Ecological Receptor

Ecological Importance	Attributes of Ecological Receptor
International (European)	<p>Habitats</p> <p>An internationally designated site or candidate site i.e. Special Protection Area (SPA), provisional SPA (pSPA), Special Areas of Conservation (SAC), candidate SAC (cSAC), Ramsar site, Biogenetic/Biosphere Reserve, World Heritage Site or an area which meets the published selection criteria for such designation. A viable area of a habitat type listed in Annex I of the Habitats Directive, or smaller areas of such habitat that are essential to maintain the viability of a larger whole. Any river classified as Excellent A1 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.</p> <p>Species</p> <p>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.</p>
National (Scottish)	<p>Habitats</p> <p>A nationally designated site i.e. Site of Special Scientific Interest (SSSI), Areas of Special Scientific Interest (ASSI), National Nature Reserve (NNR), Marine Nature Reserve, or a discrete area, which meets the published selection criteria for national designation (e.g. SSSI selection guidelines). A viable area of a priority habitat identified in the UK Biodiversity Action Plan (UK BAP), or of smaller areas of such habitat that 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.</p> <p>Species</p> <p>A regularly occurring, regionally or county significant population/number of an internationally/nationally important species. Any regularly occurring population of a nationally important species that is threatened or rare in the region or county (see local BAP). A feature identified as of critical importance in the UK BAP.</p>
Regional (North East Scotland)	<p>Habitats</p> <p>Sites that exceed the county-level designations but fall short of SSSI selection criteria. Viable areas of key habitat identified in the Regional BAP or smaller areas of such habitat that are essential to maintain the viability of a larger whole. Viable areas of key habitat identified as being of regional value in the appropriate SNH Natural Heritage Future area profile. 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.</p> <p>Species</p>

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Ecological Importance	Attributes of Ecological Receptor
	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	<p>Habitats</p> <p>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). A viable area of habitat identified in County/District BAP or in the relevant SNH Natural Heritage Future area profile. A diverse and/or ecologically valuable hedgerow network. Semi-natural ancient woodland greater than 0.25 ha. Any river classified as Good A2 or Fair B and likely to support coarse fishery. Any river with a Habitat Modification Score indicating that it is Significantly Modified or above.</p> <p>Species</p> <p>Any regularly occurring, locally significant population of a species that is listed in a County/District BAP on account of its regional rarity or localisation. A regularly occurring, locally significant population of a county/district important species (particularly during a critical phase of its life cycle). Sites supporting populations of internationally/nationally/regionally important species that are not threatened or rare in the region or county, and 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.</p>
Local (Immediate local area or village importance)	<p>Habitats</p> <p>Areas of habitat considered to appreciably enrich the habitat resource e.g. species-rich hedgerows, ponds etc. Sites that retain other elements of semi-natural vegetation that due to their size, quality or the wide distribution of such habitats within the local area are not considered for the above classifications. Semi-natural ancient woodland smaller than 0.25ha. Any river classified as Fair B or Poor C and unlikely to support coarse fishery. Rivers with a Habitat Modification Score indicating that it is Severely Modified or above.</p> <p>Species</p> <p>Populations/assemblages of species that appreciably 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.</p>
Less than Local (Limited ecological importance)	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.

2.5 Impact Assessment

2.5.1 The approach to the assessment of impacts in terms of magnitude and significance is presented in Chapter 25 (Ecology and Nature Conservation), paragraphs 25.1.9 – 25.1.11 and Tables 25.6 and 25.7.

2.6 Limitations to Assessment

2.6.1 Seasonal constraints and delays in agreeing access led to some areas to be surveyed for the hibernacula, monitoring, emergence and activity surveys being incomplete.

2.6.2 Surveys are ongoing at the time of writing this report and the full results will be published in an Environmental Report later in 2007. Pending completion of these surveys, a provisional assessment on bats has been undertaken.

Health and Safety

2.6.3 Due to physical hazards and the presence of livestock and horses in fields throughout the survey area, it was not always possible to access all habitats of potential value during evening activity surveys. Alternative routes close to habitats of value were used wherever possible, however some small areas were not surveyed due to the potential risks to surveyors.

Access

- 2.6.4 Initially, a limited number of buildings were inspected internally for the presence of bats, due primarily to the difficulty of obtaining homeowner permission. Lack of access permission prevented assessment of a small number of properties. Whilst a number of lone buildings in Milltimber were assessed for roost potential, due to the number of buildings in Milltimber within the study area, identification of individual buildings within the more concentrated areas supporting potential building roosts was not attempted. Activity surveys were used to supplement information in this area, but access constraints prevented a full set of activity surveys being completed. As these surveys are currently being completed, assessments should be considered, at least in part, to be provisional. However, preliminary analysis of 2007 survey data suggests that there will be no significant changes to the assessments in this report and it is envisaged that the further data will re-confirm the initial assessment.

Surveyor Expertise

- 2.6.5 While all survey work was supervised by ecologists with suitable levels of bat survey experience the scale of the survey effort required resulted in surveyors with variable levels of expertise assisting with fieldwork.
- 2.6.6 All survey work was supervised by at least one of the following ecologists with suitable bat survey experience:
- Claire Hopkins (Assistant Ecologist, Jacobs) – Licensed bat worker, 4 years' experience with bat surveys;
 - Graham Rankin (Senior Ecologist, Jacobs) – 5 years' experience with bat surveys;
 - Jonathan Guarnaccio (Ecologist, Jacobs) – Licensed bat worker, 5 years' experience with bat surveys;
 - Mark Jackson (Ecologist, Jacobs) – 3 years' experience with bat surveys;
 - Katie Finlison (Assistant Ecologist, Jacobs) – 2 years' experience with bat surveys;
 - Robert Parkin (Arboriculturist, Jacobs) – trainee bat worker, 1 years' experience with bat surveys;
 - Alex Hollands (Assistant Ecologist, Jacobs) – trainee bat worker, 1 years' experience with bat surveys;
 - Nicola Tallach (Assistant Ecologist, MBEC) – 6 years' experience with bat surveys;
 - Brian Arneill (Associate Surveyor, MBEC) – Licensed bat worker, over 10 years' experience with bat surveys; and
 - David Coote (Ecologist, MBEC) – trainee bat worker, 1 years' experience with bat surveys.

Weather Conditions

- 2.6.7 Survey results are potentially influenced by recent and current weather conditions given that bat activity is reduced in poor weather. The prevailing weather conditions during the 2006 survey season were generally good for bat surveying, although surveys on several nights had to be abandoned due to rainfall. In June 2006, night survey temperatures ranged from 8 – 11 °C, with an average of 10 °C. July daytime temperatures were above the seasonal average, night survey temperatures ranged from 12 – 22 °C, with an average of 15 °C. August surveys were carried out in the first two weeks in August only however, temperatures were below the seasonal average, with temperatures recorded on night surveys ranging from 8 – 13.5 °C, with an average of 11°C.

Roost Location

- 2.6.8 While staking on trees indicates that bats may use certain trees infrequently, the nomadic nature of tree-dwelling bats makes tree roosts difficult to locate. Bats may spend only 1.75 days on average in one place before switching roost sites (Cowan, 2003). Similarly, roosts may be difficult to locate in buildings as access points are often very small and well-hidden and there may be no external indications that bats use the building. Whilst the method statement and recording system used to categorise potential roosts was considered robust and appropriate, it is possible roosts were not identified due to reasons given above. The decision to perform emergence surveys only at buildings of a certain level of potential also means that some roosts may not have been identified. Due to the size and configuration of many of the buildings, it was not always possible to view all possible exit/access sites simultaneously during emergence surveys. Therefore, particularly if bats were roosting in single or small numbers, bats may have exited some buildings without being detected.

3 Baseline

3.1 Consultation Information

- 3.1.1 The North East Scotland Biological Records Centre (NESBReC) and the University of Aberdeen provided no recent data for the survey area, although Aberdeen University has published a number of scientific papers of studies undertaken in the Aberdeenshire area (e.g. Rydell et al., 1994). Isobel Davidson of Aberdeen Bat Group provided the data presented in Table 5. No further information was given regarding the precise location of these roosts, the species using them, the numbers present or the year recorded. The records that fall within the study area are indicated in Figure 25.5d. Four roosts were identified in Milltimber and two of these were within the study area. Numerous roost sites were identified in Peterculter.
- 3.1.2 Reference has been made in this report to a Leisler's bat that was identified from the Dee crossing at Peterculter on 29 June 1993 by researchers at Aberdeen University. Additional sightings have been made elsewhere on the River Dee (Drumoak, 15km southwest of Aberdeen) and on two separate locations over the River Don (Rydell et al., 1993). These are the most recent sightings recorded in Aberdeen and were thought to represent a population that had previously been overlooked or suggest that the species distribution is spreading.
- 3.1.3 The bat group carried out a dusk and dawn survey within Kingcausie at the end of June 2006. They recorded pipistrelle along the track between Dalfogart lodge (NO 863 990) and the farm buildings (NO 866 999). Near a small fire pond, possibly NO 875 996, Daubenton's, common and soprano pipistrelle were recorded.
- 3.1.4 Ten of the 60 known Daubenton's bat maternity roosts in Britain are located in the Deeside and Donside valleys (Racey, undated). No further information is known about the specific location of roosts in relation to the study area, but the proportion of the Dee Valley to be affected by the proposed scheme is likely to be relatively small and many of the known roosts are likely to be outwith the study area. The Dee is however considered to be an important resource for this species.

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Table 5 – Bat Roost Records in the Study Area (data provided by Aberdeen Bat Group)

Km Square	No. of Roosts
NJ 857 026	1
NJ 855 014 †	2
NJ 860 060	1
NJ 851 014	1
NJ 868 066	1
NJ 867 593	1
NJ 856 021	1
NJ 873 015	1
NJ 866 019	1
NJ 873 013	1
NJ 878 025	1
NJ 874 024	1
NJ 882 027	1
NJ 882 025	1
NJ 888 032	1
NJ 886 032	1
NJ 887 193	1
NJ 895 033	1
NJ 894 032	1
NJ 895 032	5
NJ 868 015	1
NJ 834 006	1
NJ 835 015	1
NJ 844 007	1
NJ 835 014	1
NJ 842 009	2
NJ 835 013	5
NJ 840 010	2
NJ 842 009	1
NJ 834 014	4
NJ 845 012	1
NJ 850 008 †	1
NJ 835 012	1
NJ 838 010	1
NJ 834 013	1

† Indicates roost within study area

3.2 Survey Results

3.2.1 This section of the report and Figures 25.4a–h and Figures 25.5a–h present the main findings of field surveys. Survey results are presented using a spatial framework that is based on a series of Habitat Areas defined in Appendix 25.1 (Terrestrial Habitats). Isolated areas of habitat such as waterbodies or wetland areas, which are of particular value or potential value to bats, groups of smaller features such as buildings or trees with value or potential value to bats and areas with collective value as a result of their proximity, connectivity or similarity to each other, are described according to their Habitat Area and cross-referenced accordingly. In each case, features within

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Habitat Areas have been identified regardless of whether or not bats were observed using them. Bat activity results are shown separately from other results for each of the geographical sections below, although bat activity results have been incorporated into the descriptions of features of interest to bats. Bat activity recorded outside the study area has not been included in the survey results or in the evaluation. It is indicated on mapping figures to show where activity surveys were carried out and to indicate where commuting or foraging routes of value outside the corridor connect with those inside the study area.

- 3.2.2 Figures 25.5a-h show habitat of general value to bats (including woodland, linear features, waterbodies and wetland areas), confirmed roosts and features with roost potential, as well as, identifying their suitability/roost potential category (assessed as described in Section 2.2). Activity survey results are displayed with the location of the recorded activity, along with details of behaviour observed (whether the bat was foraging or commuting). Bat flight lines are also marked where bats were observed to fly repeatedly along the same route or one or more bats were observed commuting along a linear landscape feature.
- 3.2.3 Areas where no bat activity is shown on the figures is not necessarily an indication that bats do not use an area, but may reflect the particular route followed by surveyors, the time when the surveyors passed the area or the prevailing weather conditions experienced. There are some instances where activity shown on the maps is not included in the activity survey results tables. This is due to sightings and observations made during emergence surveys. Such sightings have been described in the results section.

Summary of Baseline, Survey Coverage and Omissions

- 3.2.4 Figures 25.4a-h indicate where bat activity surveys were carried out, the routes followed by surveyors and the species, numbers and activity recorded. Activity surveys were completed for the whole study area as described in Section 2.2, focusing on habitats of value to bats. However several potential commuting routes were identified during day and activity surveys which require commuting route surveys to be completed in 2007 (these potential commuting routes are identified on Figures 25.4a-h along with routes where commuting bats were observed). Of the 39 potential commuting routes identified, 13 have been surveyed once and 36 required a second survey. Further commuting routes may be identified during surveys being completed in 2007.
- 3.2.5 Due to access restrictions, a total of 38 properties remain to be assessed for bat roost potential and subsequent requirement for emergence surveys. Of the identified building roosts, 15 require emergence surveys during the 2007 survey period. Of the buildings identified as being potential roosts, 25 require emergence surveys. Ten of the identified commuting routes within the study area require a second survey, whilst a further 34 require two surveys. These surveys are being undertaken in 2007. All buildings which have been surveyed, their roost potential category and those which require further survey are indicated on Figures 25.5a-h.
- 3.2.6 Where bat numbers were recorded as 'constant' or 'many' on activity survey forms this has been included in the following tables as 30+ and added to the total figure as 30. Where 'hundreds' of bat passes were recorded on survey forms a figure of 100 has been used to calculate the total number of passes and 100+ used in the tables to indicate that foraging was continuous with hundreds of bat passes.

Section SL1

- 3.2.7 Section SL1 includes ten Habitat Areas. The section is characterised by several areas of mainly plantation woodland, although several smaller sub-areas are broadleaved / semi-natural woodland. There are several areas of swamp / marsh as well as marshy grassland. Areas of improved and semi-improved grassland are interspersed between the above habitats. Linear features include woodland edges/rides, roads, tracks and dry stone walls. There are several small waterbodies within Section SL1.

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- 3.2.8 This section includes two building roosts, one of which requires an emergence survey in 2007. Daytime surveys identified 18 further potential roosts, four of which require emergence surveys. A further 15 properties require assessment and potential emergence survey in 2007. One potential tree roost (category 2b) has been identified in the section, however Habitat Area S9 requires surveys for potential tree roosts to be carried out in 2007.
- 3.2.9 Foraging habitat was identified at Hare Moss, woods west of Greenhowe, agricultural fields west of Duff's Hill, Duff's Hill itself, Greenhowe, agricultural fields south of Greenhowe, bog south of Greenhowe, wood/scrub mosaic east of Greenhowe, and Hatton Wood. Several potential and confirmed commuting routes have also been identified within this section.
- 3.2.10 A total of 27 bat passes were recorded during activity surveys within this section. Of these passes, 21 were foraging bat passes and six were commuting bat passes that were attributed to common and soprano pipistrelle (note access to all areas of value was not possible and the activity survey was largely conducted from roads / tracks). This is the lowest level of bat activity recorded over all Habitat Areas, which may be in part a reflection on the lower survey effort in this section as the area was surveyed in 2004 and found to be of generally low to medium value to bats.
- 3.2.11 The results from the Section SL1 are shown in Table 6 and Table 7, as well as in Figures 25.4a–b and 25.5a – 25.5b.

Table 6 – Specific Features Within Section SL1

Habitat Area	Feature	Feature Type	Description / Additional information
S1	Hatton Wood	Commuting, potential foraging.	Birch woodland, which although derived from plantation is beginning to develop a semi-natural ground flora. The canopy is relatively open in places. The woodland is likely to provide foraging habitat of medium value, and forms part of potential commuting habitat, being connected by roads/ tracks / walls. There are no buildings in this Habitat Area.
S2	Agricultural fields east of the A90	Two roosts, commuting and foraging habitat, potential roosts.	A series of largely improved fields, many of which are separated by dry stone walls. In addition to roads / tracks, these features are likely to provide commuting habitat. Night activity survey recorded four passes by common pipistrelles travelling north along the track east of Hatton Cottage. The area includes one roost identified during day survey at Mains of Charleston, and four potential roosts (one of which underwent emergence survey and no bats were observed emerging). Emergence survey at Lochview recorded one common pipistrelle roosting in a barn. This bat was then observed to commute east towards Loirston Loch. A foraging pipistrelle was recorded in the vicinity during the emergence survey (2006) and during previous survey in 2004. Outstanding survey effort includes up to seven properties.
S3	Wood/scrub mosaic east of Greenhowe	Potential foraging and commuting habitat.	This Habitat Area contains an extensive dense gorse scrub in the north, merging into a bracken/conifer plantation assemblage towards the south. Willow carr and marshy grassland have begun to develop around Greenhowe Quarry Pond, the walls of which contain cracks, and the water provides potential foraging habitat. The features within this Habitat Area are likely to provide medium to high value foraging habitat. Night activity survey did not cover this Habitat Area, which was originally surveyed in 2004.
S4	Bog south of Greenhowe	Potential foraging habitat.	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. This Habitat Area is likely to provide foraging habitat of high value. There are no buildings within this Habitat Area.

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Habitat Area	Feature	Feature Type	Description / Additional information
S5	Agricultural fields south of Greenhowe	Foraging and commuting habitat, potential building roosts.	Dominated by large arable and improved fields, this Habitat Area also contains a drain and associated marshy grassland with influence of bog species. The wetter features in particular are likely to provide foraging habitat of medium value. Linear features such as roads, tracks and walls with vegetation are likely to provide commuting routes. Activity survey recorded one commuting soprano pipistrelle pass in the east of the Habitat Area, and three passes of foraging common pipistrelle near Fair View. Four potential roosts were identified of which one requires emergence survey. Outstanding survey effort includes up to three buildings.
S6	Greenhowe	Foraging and commuting habitat, potential building roosts.	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. These features are likely to provide foraging resources of medium potential for bats. This Habitat Area includes two properties which have not been surveyed due to lack of access permission and require day survey. Two potential building roosts were identified (2b category). Night activity survey recorded a pipistrelle commuting along the forest / field boundary in the southwest of this Habitat Area. Forest edges, rides and tracks are likely to provide commuting routes.
S7	Duff's Hill	Potential commuting and foraging habitat.	Dense pine plantation with broadleaved edge and a strip of scrub, however, virtually no ground flora is associated with this forest. The part of the Habitat Area to the north of the road dividing this Habitat Area has been felled. Although the road edge of the remaining woodland and the woodland edge may be of medium value as a commuting route, this Area is likely to be of relatively low value in terms of foraging.
S8	Agricultural fields west of Duff's Hill	Foraging and commuting habitat, potential building roosts.	Series of improved, poor semi-improved and arable fields. Several dry stone walls are present, whilst shrubs are extremely sparse. The majority of the Habitat Area is likely to be of low value for bats in terms of foraging, however common pipistrelles were recorded foraging within the shelter belt associated with Duff's Hill during an emergence survey. Potential commuting value is medium due to the presence of walls and the field edge boundary with the forested area. Potential roosts include the property of Duff's Hill, although no bats were recorded emerging on the night of survey. A further six potential roosts were identified on day survey, however only two of these require emergence survey.
S9	Wood west of Greenhowe	Foraging and commuting habitat, potential building and tree roosts.	The majority of this Habitat Area is composed blocks 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. Several parts of the Habitat Area are likely to provide commuting and foraging habitat of medium value to bats. The road dividing this Habitat Area was identified as a potential commuting route. Activity survey recorded two pipistrelles foraging near Clifton Cottage. Due to lack of access permission only two of the properties in this Habitat Area were assessed for roost potential, both of these being of 2b status. This Habitat Area requires further survey next year to assess three further properties as well as potential tree roosts.
S10	Hare Moss	Potential foraging and commuting habitat.	This Habitat Area comprises of a number of heather-dominant bog communities with willow and birch, extensive areas of marsh with willow and birch associated with vegetated drains, and extensive dense scrub, particularly towards the south. This Habitat Area was not subject to night survey for bat use, but is likely to provide habitat of medium value for foraging and commuting, and is likely to be of low value for roosting purposes due to the absence of man-made structures and suitable trees.

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Table 7 – Bat Activity Results for Section SL1

Grid Reference	Habitat / Location	Species	Number of Bat Passes	Activity ¹	Notes
NO 913 997	Road	Pipistrelle	2	F	Beside last house out of village
NO 914 994	Road	Pipistrelle	7	F	Road next to west meadow
NO 914 991	Hare Moss Cottage	Pipistrelle	7	F	Hare Moss cottage
NO 914 989	Southfields	Pipistrelle	2	F	Junction at Southfields
NO 918 996	coniferous forest	Soprano Pipistrelle	1	C	Near coniferous forest
NJ 926 005	Hatton Cottage	Common Pipistrelle	4	C	Going up lane by Hatton Cottage
NO 928 997	Depot	Soprano Pipistrelle	1	C	By depot
NO 925 995	Fair View House	Common Pipistrelle	3	F	Just one bat flying around Fair View House

Section SL2

- 3.2.12 Section SL2 contains seven Habitat Areas. The section is characterised by semi-improved and improved grassland, as well as marshy grassland and scrub. There are several substantial areas of woodland including broadleaved and native species. Several waterbodies, burns, pools and wet drains/ ditches are also present.
- 3.2.13 This section contains 20 properties that were identified as potential roosts during day surveys, although bats were not observed during emergence surveys at four of these properties and no confirmed roosts were identified. Six emergence and five daytime building surveys are outstanding for this section of the study area. Six areas have been identified where individual trees or groups of trees have potential for use as roosts (category 2a or 2b).
- 3.2.14 The western part of this section, in particular, provides a variety of high value foraging habitat and commuting routes. Foraging and commuting activity were recorded along tree and scrub-lined roads and access tracks, and woodland edges. A number of potential commuting routes have also been identified, but require further surveys to confirm their use. This section forms a part of a wider high value habitat for bats which lies to the northwest, north and northeast of the study area including Kingcausie in Section SL3 and Shanna Burn Wood to the north of the study area.
- 3.2.15 During the surveys, 221+ bat passes were recorded. Of these passes, 202+ were foraging bat passes, 17 were commuting bat passes and one was a commuting/foraging pass that was attributed to common or soprano pipistrelle. One brown long-eared bat commuting pass was recorded. Additional foraging activity was observed during the emergence surveys around the properties at Bishopston, Newland, Greenloaning and Whitestone.
- 3.2.16 The results from Section SL2 are shown in Table 8 and Table 9, and in Figures 25.4b–c and 25.5b–c.

¹ C= Commuting, F=Foraging, SC=Social Calling

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Table 8 – Specific Features Within Section SL2

Habitat Area	Feature	Feature Type	Description / Additional Information
S11	North of Sunnyside	Foraging and commuting habitat.	Plantation birch/ rowan woodland, part of which is becoming semi-natural with time and is likely to provide foraging habitat of high value to bats, whilst the rides / woodland edges are likely to support bats commuting between Clochandighter Wood (HA-S14) and Shanna Burn Wood (to the north of the study area). Activity surveys did not cover the interior of the wood, however pipistrelles were recorded foraging along the track on the NW wood edge, where one commuting bat was also recorded.
S12	Greenloaning Wood	Foraging and commuting habitat.	Broadleaved woodland including pools, burns and channels is likely to provide foraging habitat of high value, and woodland edges / rides are likely to be used as commuting routes as the wood is well connected to other areas by tracks and further woodland. Roosting potential is low. Activity surveys were not carried out within this woodland but did cover the track that passes through the eastern edge. This recorded foraging soprano and common pipistrelles along the track within the wood. There is a recording of a probable brown long-eared bat commuting along this track.
S13	Agricultural fields around Sunnyside to Causeyport	Foraging and commuting habitat, potential tree/building roosts.	A series of improved and horse-grazed semi-improved fields. Small copses of broadleaved woodland surrounded by walls are present although the ground flora is species-poor. Although much of the improved grassland is likely to provide poor foraging habitat, the broadleaved habitat is likely to provide some foraging opportunities. Several linear field drains / ditches are present which are likely to provide high foraging habitat as well as commuting routes of medium value. Several other potential commuting routes were identified mainly along linear features such as roads / walls / vegetation. Several of these routes were confirmed as commuting routes during night surveys. This area includes up to 16 properties (some with multiple buildings) with identified roost potential, five of which require emergence surveys. Outstanding day assessment includes three properties. Two trees near Hare Moss Cottage were recorded as having roost potential. Activity surveys recorded primarily common and soprano pipistrelles foraging along several of the roads and tracks used for survey, although two brown long-eared bats were recorded foraging in the courtyard of Bishopston Farm. Many of the foraging records were obtained along treelines / vegetated linear features.
S14	Clochandighter Wood	Foraging, potential commuting habitat.	The majority of the mature conifer plantation that lies within the study area has been felled. The remaining portion is dominated by lodgepole pine and spruce with low inherent potential for roosting. Dry heath dominates the rides and is also present under much of the plantation. This area is likely to provide foraging habitat of medium value, and activity survey recorded four passes of soprano pipistrelles foraging along the felled woodland edge. The woodland edges / rides are also likely to be used as commuting habitat.
S15	Whitestone Wood and Hill of Blairs	Commuting and foraging habitat, potential tree and building roosts.	Mature conifer plantation is the dominant habitat within this HA. This has a rich ground flora, particularly within Hill of Blairs. Areas of dry heath, wet heath and bog also exist within Hill of Blairs, as do areas of dense bracken and continuous scrub, supporting insect populations suitable for edge feeding bats. Whitestone wood has a broadleaved edge, and includes several large beech trees with high roost potential. The majority of the habitat within this Habitat Area provides foraging habitat of high value. This was confirmed by activity surveys. An old quarry pond south of Hill of Blairs provides excellent foraging habitat evidenced through activity surveys. Within this area, bats were recorded commuting along linear features such as woodland edges and rides, tracks and gorse lined stone walls. The majority of bats recorded were soprano and common pipistrelles, however a probable recording of Daubenton's bats was made at the old quarry waterbody. The Habitat Area contains two potential building roosts, however no bats were observed emerging from Whitestone on the night of survey. Outstanding survey effort includes two further properties.
S16	Agricultural fields to the east of	Commuting and foraging	Improved grassland with some marshy grassland dominates this Habitat Area. There are several field drains/ ditches within the area

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Habitat Area	Feature	Feature Type	Description / Additional Information
	Burnhead to Greenloaning	habitat, potential tree and building roosts.	that are likely to provide foraging as well as commuting habitat. Trees and hedgerows are present within some of the fields and surrounding the Habitat Area, as are dry stone walls, again likely to provide foraging and commuting habitat. The area contains three properties identified as potential roosts, however, no bats were observed emerging from Greenloaning on night survey. The track lined with largely mature beech crossing the Habitat Area in particular forms an important commuting and foraging route for pipistrelles, confirmed during activity surveys. This avenue of mature beech trees were identified as having high potential for use as roosts. Several ivy covered cherry trees near Merchant's Croft were identified as having some potential for use as roosts. The majority of bats recorded during surveys within the Habitat Area are soprano and common pipistrelles, although there is a recording of probable brown long-eared bats foraging at Greenloaning. Although subject to greater exposure, the eastern part of this Habitat Area provides potential foraging and commuting habitat due to scrub and gorse lined walls, however no bats were recorded here during activity surveys.

Table 9 – Bat Activity Results for Section SL2

Grid Reference	Habitat / location	Species	Number of Bat Passes	Activity ²	Notes
NO 875 985	Road	Soprano Pipistrelle	1	C	Across road and fields heading northeast at ~ 2m
NO 876 986	Clyanthus Lodge	Common Pipistrelle	5	F	Single pipistrelle at ~4m, by trees at back of garden and shed
NO 890 982	Clochandighter	Soprano Pipistrelle	3	F	Along plantation edge/road
NO 893 992	Track	Brown long-eared	1	C	Following track
NO 894 991	Track	Common Pipistrelle	3	F	Following track
NO 894 989	Track	Pipistrelle	3	F	Following track
NO 894 990	Track	Soprano Pipistrelle	15	F	Following track
NO 889 992	Road	Soprano Pipistrelle	1	C	Along road
NO 888 991	Road	Common Pipistrelle	1	F	Two bats flying in opposite directions
NO 890 986	Road beside Clochandighter	Soprano Pipistrelle	1	F	Along road
NO 894 989	Track	Soprano Pipistrelle	1	C	Along track
NO 894 991	Track	Soprano Pipistrelle	1	C	Along track
NO 894 992	Track	Soprano Pipistrelle	1	F	Along track
NO 879 986	By wood behind Whitestone	Soprano Pipistrelle	1	C	Flying along woodland edge, east to west at ~ 5m
NO 879 988	By wood behind Whitestone	Soprano Pipistrelle	1	F	Feeding at corner of field, around edge, flying high

² C= Commuting, F=Foraging, SC=Social Calling

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Grid Reference	Habitat / location	Species	Number of Bat Passes	Activity ²	Notes
NO 878 988	Woodland	Soprano Pipistrelle	30+	F	Continuous activity along woodland edge 3m
NO 879 985	Track	Common Pipistrelle	2	F	Along track 3m
NO 882 986	Field boundary	Soprano Pipistrelle	1	F/C	Along gorse/ just above wall flying south to north at ~ 2m
NO 884 988	Blair Wood	Soprano Pipistrelle	1	C	Near edge of Blair wood – flying west to east at ~ 4m
NO 884 988	Pond, Hill of Blairs	Soprano Pipistrelle	4	F	Four bats at edge of wood and above pond at Hill of Blairs, flying low
NO 886 989	Hill of Blairs	Soprano Pipistrelle	1	C	Flying from derelict farm to Hill of Blairs, at ~ 2m
NO 888 989	Gleenloaning	Soprano Pipistrelle	3	F	Flying low around trees
NO 881 984	Cleanhill Wood	Common Pipistrelle	5	C	Flying along track, five bats all going toward Cleanhill Wood
NO 900 986	Permanent pasture	Pipistrelle sp.	3	F	Road next to cottage and permanent pasture
NO 900 990	Road	Pipistrelle sp.	30+	F	Road next to cottage
NO 900 991	Permanent pasture, Little Bishopston	Pipistrelle sp.	30+	F	Road at Little Bishopston beside permanent pasture
NO 900 992	Improved Pasture	Pipistrelle sp.	3	F	Along road beside improved pasture
NO 912 989	Arable/grazing	Pipistrelle sp.	1	F	At wall intersection between arable / grazing
NO 884 988	Pond, Hill of Blairs	Soprano Pipistrelle	10	F	Hill of Blairs, two bats over pond possibly including Daubenton's 1-4m
NO 884 989	Pond, Hill of Blairs	Common Pipistrelle	2	F	Hill of Blairs, Over pond one bat, 1-4m
NO 883 990	Hill of Blairs	Soprano Pipistrelle	3	F	Hill of Blairs, foraging at edge of clearing
NO 876 987	Red Tile Lodge	Soprano Pipistrelle	30+	F	One bat foraging along road overhead many passes
NO 880 985	Hedge-lined track	Soprano Pipistrelle	1	C	One bat commuting along hedge-lined track
NO 881 984	Hedge-lined track	Soprano Pipistrelle	1	C	One bat commuting along hedge-lined track
NO 883 983	Hedge-lined track	Soprano Pipistrelle	1	C	One bat commuting along hedge-lined track
NO 883 982	Track	Soprano Pipistrelle	4	F	Along track overhead at 3-4m
NO 889 990	Road between Auchlunies house and Clochandighter	Common Pipistrelle	1	C	Along road
NO 889 989	Road between Auchlunies House and Clochandighter	Common Pipistrelle	1	C	Along road

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Grid Reference	Habitat / location	Species	Number of Bat Passes	Activity ²	Notes
NO 882 984	Road	Soprano Pipistrelle	4	F	Not seen, but picked up on bat detector
NO 883 983	Road	Soprano Pipistrelle	1	F	Along road
NO 883 982	Road	Soprano Pipistrelle	4	F	Along road
NO 883 984	Road	Common Pipistrelle	2	F	Not seen, but picked up on bat detector
NO 883 983	Road	Common Pipistrelle	2	F	Not seen, but picked up on bat detector
NO 884 982	Road	Common Pipistrelle	1	F	Along road

Section SL3

- 3.2.17 Section SL3 contains 15 Habitat Areas. This section includes important water features such as the River Dee, Crynoch Burn, Blaikiewell Burn and several minor burns / ditches. Other predominant habitat types include both broadleaved and conifer plantation and semi-natural woodland, interspersed with improved and semi improved grassland, arable fields and grazed parkland.
- 3.2.18 The section includes eleven roosts, two of which are anecdotal records and one of which was observed in a tree. A further 16 properties/buildings were identified as having roost potential, although emergence surveys conducted on eight of these did not record any bats emerging. Outstanding survey effort includes ten emergence surveys and five day surveys of buildings to determine their roost potential. Four culverts/ bridges have been identified as having medium potential for roosting due to the suitability of location and presence of suitable gaps and cracks. Many trees in the section, particularly within Kingcausie, have been identified as having high roost potential.
- 3.2.19 The night survey results from activity and emergence surveys confirm that this section provides high value commuting and foraging habitat and is likely to support many bats and bat species. The relatively high number of species detected in this area (six species) also indicates the high quality of habitat and the generally low levels of disturbance throughout much of this section of the study area. Foraging activity was recorded throughout Kingcausie, along the River Dee, along Crynoch Burn and the grounds of Story Book Glen, within Camphill Estate and along the Deeside Old Railway Line. Commuting activity was also recorded along linear features throughout Kingcausie, along Crynoch Burn, along the River Dee and along the B979 between Milltimber and the River Dee. One potential commuting route has yet to be surveyed along the Deeside Old Railway Line.
- 3.2.20 The activity surveys recorded 1059+ bat passes. Of these passes, 705+ were foraging bat passes (of which 119+ included social calls), 60 were commuting bat passes, 56 were commuting/foraging passes that were attributed to common or soprano pipistrelle and 22 passes were attributed to foraging Natterer's bats. One commuting pass and 200+ foraging and social calling passes were attributed to Daubenton's bat. In addition, brown long-eared bats were observed during evening emergence surveys at Rumlin's Fauld. A single sighting of two Leisler's bats making 30+ passes whilst social calling within Kingcausie at Rumlins Fauld was reported. Despite subsequent surveying effort in late summer and autumn 2006 no further Leisler's sightings or calls were reported. As a rare species at the northern limits of its range in the UK, the sighting of a Leisler's in Kingcausie requires further survey effort to establish their status in spring and summer 2007. Finally, an additional 39+ commuting/foraging pipistrelle and Daubenton's were recorded over the River Dee.
- 3.2.21 The results from Section SL3 are shown in Table 10 and Table 11, and in Figures 25.4c–d and 25.5c–d.

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Table 10 – Specific Features Within Section SL3

Habitat Area	Feature	Feature Type	Description / Additional information
S17	Agricultural fields south of Cleanhill Wood	Commuting and foraging habitat, one building roost, potential building roost.	This Habitat Area is dominated by improved fields with a small area of species poor marshy grassland. This is likely to provide relatively low foraging habitat for bats. The avenue separating these fields comprises a mixture of broadleaved trees, most of which have been assessed as having potential for use as roosts. The avenue provides a sheltered foraging and commuting feature connecting foraging habitat in Cleanhill Wood and resources at Hill of Blairs in Section SL2. Red Tile Lodge was identified as a roost on day survey (requires emergence survey). Clyanthus Lodge was identified as a potential roost, although no bats were observed emerging on night of survey. The emergence survey at Clyanthus Lodge indicated that the garden and surrounding woodland provide foraging habitat for common and soprano pipistrelles. The tracks were also used as a commuting route.
S18	Durris Forest	Foraging and commuting habitat.	Large area of plantation woodland, both of broadleaved and conifer trees, with foraging and potential. The part of the area within the study area is largely mature conifers with low inherent roost value but forms part of a larger area of value and as such is likely to provide foraging and commuting habitat of high value due to the presence of a track ride and proximity to Crynoch Burn. The trees are not suitable for roosting. Activity survey included the part of this area within the study area and recorded both commuting and foraging pipistrelle bats along the track.
S19	Blaikiewell Farm	Potential foraging and commuting habitat.	Sequence of horse grazed semi-improved fields with occasional buildings. The fields are bordered by Blaikiewell Burn to the northeast, and Crynoch Burn lies in close proximity in the east, both of which provide sheltered foraging and commuting habitat bordered by woodland (S18 and S20). The rides are lined with shrubs approaching hedgerows. Parts of this Habitat Area are likely to be of medium to high value for commuting and foraging and the Habitat Area forms part of a wider area of high value habitat including Crynoch Burn and Kingcausie. The only buildings within the HA are assessed as having no roost potential. Activity surveys covered only a small part of this area due to the presence of stock, and did not record any activity.
S20	Cleanhill Wood	Tree roost, foraging and commuting habitat, potential building / tree roosts.	Mature conifer plantation dominates overall. However, this Habitat Area also contains significant amounts of semi natural broadleaved woodland, particularly to the east. The HA includes Blaikiewell and Crynoch Burns and associated pools, tracks and boggy areas. There are many parts which offer high value habitat for roost and foraging. The Habitat Area has good connectivity and commutable features both within and between other Habitat Areas of value including the rest of Kingcausie. A number of trees have been identified as having high potential for use as roosts, with one displaying signs of probable past use. Day survey identified one potential building roost at Blair Crynoch, however an emergence survey is outstanding. Night survey indicated the quality of habitat within this HA and the connectivity between other Habitat Areas of value. Many bats were recorded foraging along the woodland edges and along some of the tracks within the wood. A number of commuting bats were also recorded. The majority of species were common and soprano pipistrelles, although Natterer's and Daubenton's were also recorded. The Habitat Area is currently subject to low disturbance levels.
S21	Agricultural fields below Parkhead	Potential commuting and foraging habitat, potential roost.	The only part of this area within the study area comprises of large arable fields which are likely to be of low value to bats. However, the edge habitat may be of low to medium value for commuting and foraging. The part of the area within the study area is subject to low levels of disturbance. One building with bat roost potential lies within the corridor as identified on day survey. This area was not surveyed at night.
S22	Floodplain and immediate surrounds of Crynoch Burn (north) and Blaikiewell Burn	Two roosts, foraging and commuting habitat, potential roosts.	Semi-natural broadleaved woodland lines much of the Habitat Area. Crynoch Burn passes adjacent to the amenity parkland of Storybook Glen, where day survey identified many trees with high roosting potential. Blaikiewell Burn is on the west side of the road edging the southwest border of Cleanhill Wood and is identified as a potential commuting route. Although bats are also likely to be following the edge of the adjacent woodland, night survey indicated these combined linear features provide important foraging and commuting habitat. At Dalfogart Cottage Blaikiewell Burn passes through a culvert which has been assessed as having medium roosting potential, before passing east of the segment of

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Habitat Area	Feature	Feature Type	Description / Additional information
			woodland in S18, joining Crynoch Burn downstream of Redwing Stables. Night survey showed Crynoch Burn to be of high value to bats for both commuting and foraging with very low levels of disturbance. Day survey identified the woodland to the west of Crynoch Burn near Corbie Linn as having many trees with high potential for use as roosts, as well as providing further foraging habitat of high value. Night survey revealed that farther to the south where the Crynoch passes through conifer plantation woods the burn is of high value to foraging bats. The Habitat Area includes two building roosts at Storybook Glen and the house adjacent to Eastland Bridge, one of which requires emergence survey. Other outstanding survey effort includes one building day assessment. The majority of bats detected on night survey were common and soprano pipistrelles, however several passes by Daubenton's as well as brown long-eared bats were recorded by Crynoch Burn.
S23	Agricultural fields within Kingcausie	Foraging and commuting habitat, two building roosts.	This area includes several fields providing rough grazing bordered by woodland and with occasional trees and shrubs located on field boundaries. These features are likely to provide commuting and foraging habitat of medium to high value. Day survey identified several trees at the field edge on the western edge of the area that have been assessed as having high potential for use as roosts. Hedgerows within the vicinity of the dwelling houses are likely to provide high value foraging and commuting habitat. The small broadleaved plantation, located close to swamp/wet woodland is likely to provide foraging habitat of high value. A large oak tree in the garden of Eastland House was assessed as having some potential for use as a roost. The Habitat Area includes two roosts, with 16 pipistrelles recorded emerging from Eastland Cottage. Activity as well as emergence survey records indicate the high value of the Habitat Area to foraging, commuting and roosting bats, with many bats observed foraging along hedgerows, vegetation edges and above the rough pasture. The majority of bats recorded were common and soprano pipistrelles, however multiple passes by two Natterer's bats were recorded in the garden and surrounds of Eastland House.
S24	Kingcausie	Two roosts, potential roosts, commuting and foraging habitat.	This is a large Habitat Area with a number of different habitats dominated by woodland, both plantation and semi-natural in nature. The majority of the woodland in the central part of the study area is semi-natural and largely broadleaved, providing foraging habitat of medium to high value in undisturbed surroundings. Tracks and rides within the woodland areas are likely to be used as commuting routes. Kingcausie Burn is likely to provide high value foraging and commuting habitat and runs through three culverts with roosting potential. The two arable fields within this HA are likely to be of low value to bats, however the field boundaries with woodland are likely to be used for commuting / foraging. The large area of grazed parkland to the north of Kingcausie House is likely to provide foraging habitat, and 20 of the mature parkland trees of species including beech, oak, elm and ash were assessed as having high roost potential. A further 11 trees with predominantly high roost potential were identified within this Habitat Area. The Habitat Area includes seven buildings identified as potential roosts on day survey, two of which (Rumlins Fauld and the Coach House) were confirmed as roosts on emergence survey. Twenty-four soprano pipistrelles were recorded emerging from Coach House, whereas 13 bats were recorded emerging from Rumlins Fauld, and included common and soprano pipistrelles as well as brown long-eared bats. A small well house is situated adjacent to Rumlins Fauld, and has been assessed as being a potential roost (2a) with potential as a hibernaculum. Recordings from emergence, activity and commuting surveys confirm that this area provides valuable foraging, roosting and commuting habitat for a number of bat species, with common and soprano pipistrelles, brown long-eared and Natterer's all sighted in this area. There was also a single sighting of a pair of Leisler's bats. A number of bats were recorded commuting along the tree avenue to North Lodge on the east border of this Habitat Area. Bats were also recorded commuting within and across this Habitat Area, confirming it forms part of a wider high value area for bats, providing vital foraging and roosting habitat, of strategic value due to its proximity to the River Dee (S28).

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Habitat Area	Feature	Feature Type	Description / Additional information
S25	Caravan Park	Building roost (anecdotal), potential tree roosts, commuting and foraging habitat.	This Habitat Area includes a Caravan Park with amenity grassland including wet ground and a pond, scattered trees and shrubs. The area is likely to provide habitat of low to medium value for foraging, and is part of a potential commuting route joining with scrub and trees to the west. Five trees within this area have been assessed as having roost potential. The Old Mill Inn Building was reported by landowners as an anecdotal historic roost, however, the roof has since been repaired. The building requires an emergence survey. Its strategic location near the tributary of Crynoch Burn and the River Dee, two major foraging and commuting resources, would support its value as a roost for Daubenton's bats. Activity survey revealed no activity on the night of survey (despite much activity on the River Dee 50m to the north). However, the caravan park owner reported bat activity in the area.
S26	Old Mill Inn and agricultural field surrounds	Potential roost, commuting and foraging habitat.	The agricultural fields surrounding the Old Mill Inn are improved or semi-improved. Scattered broadleaf trees and conifers are also present, as is a well-vegetated field drain. This Habitat Area is bordered on the east and north by Crynoch Burn and the River Dee respectively, which are both high value Habitat Areas (S22 and S28). Therefore, the edge scrub and tree habitat form part of high value habitat and are likely to be of higher value for commuting and foraging than the fields themselves. The Habitat Area includes a property identified as being a potential roost, but which has not been subject to emergence survey. An ash tree within the grounds has been assessed as having roost potential.
S27	Agricultural fields south of the River Dee	Potential tree roosts, commuting and foraging habitat.	This Habitat Area consists of improved fields as well as grazed parkland. Trees and scrub are frequent along the margins and there is some plantation and scrub in the north of the Habitat Area. An avenue of mature trees divides this area from S24 and is likely to be an important commuting route. Overall foraging and commuting value is medium to high as trees provide shelter and abundant insects. Several trees within the grazed parkland have been assessed as having high roost potential whilst a further five have some roost potential. Due to grazing stock activity survey was performed along the tree avenue from North Lodge, confirming this as commuting and foraging habitat.
S28	Floodplain and immediate surrounds of the River Dee	Commuting and foraging habitat.	The western part of this Habitat Area is dominated by wet willow/alder woodland, with tall ruderals also present. The northeastern banks are grassland with scattered and dense scrub, plus occasional trees. The southeastern section, however, is primarily composed of woodland, though layers dominated by swamp, bracken and tall ruderals are present towards the rivers edge. Riparian vegetation provides excellent shelter and supports abundant aquatic insect prey. This Habitat Area is likely to provide high value foraging and commuting habitat, being a relatively sheltered feature with low levels of night disturbance. The bridge has been assessed as having low roosting potential. Activity surveys carried out from the north bank and the existing bridge confirm that the River Dee provides high quality habitat, supporting many bats including common and soprano pipistrelles as well as large numbers of Daubenton's bats. The River Dee is also a vital connection between roosting and foraging habitats up-and downstream.
S29	Agricultural fields south of Milltimber	Commuting and foraging habitat, potential building roosts.	A mix of improved and arable fields. Dense gorse scrub lines the roadside and floodplain edges but overall, tree/shrub cover is occasional. The habitat of value to bats within this HA is likely to be the field edges which provide linear commuting and foraging habitat of medium to high value. The Habitat Area includes two properties identified as having roost potential during day surveys, however these require emergence surveys. Outstanding survey work includes day assessment of three other properties. Activity surveys covered largely the field margins and the results are reported in the adjacent S30 and S28. The main road leading to Milltimber from the River Dee was identified as a commuting route and appears to be used by bats probably roosting in Milltimber and Camphill.
S30	Camphill School	Two building roosts (one anecdotal), potential building/ tree roosts, commuting and foraging	This area comprises of modern buildings with amenity grassland and sculptured gardens as well predominantly broadleaved semi-natural woodland. Tree roost survey identified one oak within the grounds with some roost potential. Camphill House was confirmed as a pipistrelle roost on emergence survey, and Witiko is an anecdotal roost. A further five buildings were identified on day survey as having roost potential, although emergence survey performed at one of these did not record any bats emerging. The majority of activity recorded on night survey was foraging,

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Habitat Area	Feature	Feature Type	Description / Additional information
		habitat.	with many pipistrelle bats recorded within the estate over two nights of survey work. This indicates the high value foraging habitat, especially significant due to the strategic location of this Habitat Area adjacent to the River Dee. The woodland edges of the estate are likely to be used as commuting routes connecting to other features in the vicinity. Pipistrelles were recorded commuting and foraging at the edge of the estate which borders on the main road to Milltimber, which has also been identified as a commuting route.
S31	Deeside Old Railway Line	Foraging and commuting habitat.	The track along a former railway line contains abundant trees and shrubs. Due to these features this area is likely to provide foraging and commuting habitat of high value. Activity surveys recorded predominantly soprano and common pipistrelles foraging along the track. However, a number of social calls were also recorded and the line is likely to represent an important commuting route given its linear nature and strategic location near an area of roosts (Milltimber) and the River Dee (S28).

Table 11 – Bat Activity Results for Section SL3

Grid Reference	Habitat	Species	Number of Bat Passes	Activity ³	Notes
NO 875 989	Tree lined track	Common Pipistrelle	1	F	Foraging along avenue of mature trees on either side of track
NO 874 985	Road	Natterer's	9	F	Two Natterer's circling around trees and edge of field by road 2m
NO 874 985	Road	Common Pipistrelle	30+	F	Two bats circling at 8-10m
NJ 864 002	Track	Common Pipistrelle	1	F	South / southeast up road/track into estate
NJ 862 002	Road	Pipistrelle sp.	1	C	Following road north
NO 864 995	Mixed Trees	Common Pipistrelle	1	C	Along tree line
NO 866 998	Phillips Cottage	Common Pipistrelle	1	C	Along road outside Phillips Cottage
NO 868 994	Cleanhill Wood	Soprano Pipistrelle + Natters	10	F	Following track. Six pipistrelle / four Natterer's.
NO 867 996	Track	Soprano + Common Pipistrelle	3	F	Following track. Two soprano / one common pipistrelle.
NO 874 985	Road	Natterer's	9	F	Two Natterer's circling around trees and edge of field by road 2m
NO 873 986	Track	Soprano Pipistrelle	3	F	Flying south to north following track at ~2m
NO 869 993	Track	Pipistrelle sp.	1	C	Flying north following track at ~2m
NO 869 994	Cleanhill Wood	Common Pipistrelle	3	F	Following tree line
NO 860 992	Coniferous tree line	Soprano + Common Pipistrelle	9	F	Foraging along tree line of coniferous plantation. Flying north to south at ~ 4m, two soprano and seven common pipistrelle passes
NO 860 992	Coniferous tree line	Soprano + Common Pipistrelle	1	C	One common pipistrelle commuting along tree line of coniferous plantation

³ C= Commuting, F=Foraging, SC=Social Calling

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Grid Reference	Habitat	Species	Number of Bat Passes	Activity ³	Notes
NO 862 992	Tree line	Common Pipistrelle	1	C	Along treeline between grass and burn travelling southeast at ~4m
NO 862 992	Bridge	Soprano Pipistrelle	5	F	Along burn under bridge flying northwest and southeast
NO 861 993	Crynoch Burn	Common Pipistrelle	3	C	Following direction of burn along edge of mature trees above scrub edge to flying southeast
NO 861 993	Crynoch Burn	Common Pipistrelle	1	C	Through opening in trees and scrub to mature trees flying east at ~ 5m
NO 861 993	Crynoch Burn	Soprano + Common Pipistrelle	4	C	Above burn ~ 4m, three soprano pipistrelles flying southeast and one common pipistrelle flying north
NO 860 996	Crynoch Burn	Soprano + Common Pipistrelle	14	F	Foraging along burn northwest and southeast. Eleven soprano and three common pipistrelles
NO 859 996	Crynoch Burn	Soprano + Common Pipistrelle	8	F	Localised foraging around farm animals and trees. Five common and three soprano pipistrelles
NO 860 994	Crynoch Burn	Common Pipistrelle	2	F	Localised foraging around tree edges
NO 860 994	Crynoch Burn	Common Pipistrelle	3	C	Above burn / tree edges
NO 861 991	Opening around burn with plantation and woods	Common Pipistrelle	9	F	Localised foraging over bridge / road / burn
NO 862 990	Crynoch Burn	Common Pipistrelle	12	F	Appeared to be over water on area side of trees
NO 862 988	Crynoch Burn	Soprano + Common Pipistrelle	12	F	Following tree line both southeast and northwest directions. Eight common and four soprano pipistrelles
NO 863 987	Crynoch Burn	Common Pipistrelle	8	F	Following burn
NO 863 990	Crynoch Burn	Soprano Pipistrelle	5	F	Flying northwest following road with mature trees
NO 862 991	Crynoch Burn	Soprano Pipistrelle	3	C	Flying southeast following road with trees
NJ 857 001	Crynoch Burn	Common Pipistrelle	5	F	Following the burn north and south
NJ 857 003	Crynoch Burn	Common Pipistrelle	3	C/F	Two foraging one commuting north towards the River Dee
NJ 858 001	Crynoch Burn	Common Pipistrelle	7	F	A pair circling around edge of plantation and burn / trees at 2-3m
NJ 854 004	River Dee	Common Pipistrelle	2	F	Along River Dee
NJ 857 001	River Dee	Common Pipistrelle	2	F/C	Flying at 2m, south to north following road to River Dee
NO 866 998	Phillips Cottage	Common Pipistrelle	2	F/C	Along road next to Philips cottage

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Grid Reference	Habitat	Species	Number of Bat Passes	Activity ³	Notes
NO 866 997	Road	Common Pipistrelle	3	F	Along road near wood pile
NO 866 995	Track	Common Pipistrelle	1	F	Along track
NO 865 994	Track	Common Pipistrelle	1	F	Along track and around trees at edge of field at 3m
NO 864 993	Road	Daubenton's	2	F/C	Along road, flying at 4m
NO 863 992	Woodland	Common Pipistrelle	1	C	Flying north to south along woodland edge at 3m
NO 864 994	Road	Daubenton's	1	C	Flying west to east along road at 3m
NO 862 998	Woodland	Pipistrelle sp.	1	F	In wood near tributary of burn
NO 862 999	Woodland	Common Pipistrelle	3	C/F	Close to woodland edge and near burn confluence
NO 860 997	Woodland	Common Pipistrelle	2	F	Along edge of wood at 6m
NJ 865 000	Road	Common Pipistrelle	2	C	Following road
NJ 865 000	Road	Common Pipistrelle	2	C	Following road
NJ 862 003	Road	Common Pipistrelle	2	C	Following road
NJ 861 003	Road	Common Pipistrelle	1	C	Following road
NJ 863 001	Track	Soprano Pipistrelle	1	C	Following road
NO 866 997	Road	Soprano Pipistrelle	3	F	Following road
NJ 863 002	Corner of field	Common Pipistrelle	1	C	Following road
NJ 861 003	Road	Soprano Pipistrelle	2	C	Following road
NJ 861 003	Road	Soprano Pipistrelle	4	F	Following road
NJ 862 002	Road	Common Pipistrelle	2	F	Following road
NJ 864 002	Road	Common Pipistrelle	2	F	Following road
NO 863 999	Track	Common Pipistrelle	1	C	Following road
NO 866 998	Road	Common Pipistrelle	2	F	Following road
NO 865 999	Rumlin Fauld	Common Pipistrelle	2	C	Following road in front of farm steading
NJ 862 002	Road	Common Pipistrelle	1	C	Following road
NJ 861 003	Road	Common Pipistrelle	2	F	Following road

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Grid Reference	Habitat	Species	Number of Bat Passes	Activity ³	Notes
NJ 862 002	Road	Soprano Pipistrelle	2	F	Following road
NJ 863 001	Track	Soprano Pipistrelle	3	F	Following track southwest
NJ 862 000	Track	Soprano Pipistrelle	1	C	Following track south
NO 865 999	Rumlin Fauld	Leisler's bats sighting	30+	F/SC	Incidental observation made after activity survey was complete. Pair following each other, circling around tower and flying above barn roof for approx five minutes.
NO 865 999	Rumlin Fauld	Soprano Pipistrelle	1	C	Flew into building (gable end)
NO 865 989	Road by Cleanhill Wood	Soprano Pipistrelle	7	F	Not seen
NO 864 992	Track by Cleanhill wood	Common Pipistrelle	1	F	Not seen
NO 869 988	Cleanhill Wood	Pipistrelle sp.	1	F	Not seen
NO 865 989	Road by Cleanhill Wood	Soprano Pipistrelle	1	F	Flying southeast at 6m
NO 864 990	Road by Cleanhill Wood	Common Pipistrelle	1	F	5m localised foraging south to north
NO 864 992	Track by Cleanhill wood	Soprano Pipistrelle	1	F	Not seen
NO 865 995	Track by Cleanhill wood	Soprano Pipistrelle	1	F	Flying north at 12m
NJ 858 004	River Dee	Common Pipistrelle	1	C	Above hedge near River Dee at ~2m
NJ 857 003	River Dee	Soprano Pipistrelle	3	F	Along bankside vegetation at ~2m
NJ 858 003	River Dee	Soprano + Common Pipistrelle	100+	F	River Dee (west side) above water edge and banks
NJ 857 003	River Dee	Daubenton's	100+	F/SC	River Dee (west side) above water edge and banks
NJ 858 003	River Dee	Daubenton's	100+	F/SC	River Dee (east side) above water edge and banks
NJ 859 003	River Dee	Soprano Pipistrelle	100+	F/SC	River Dee (east side) above water edge and banks
NJ 858 004	River Dee	Common Pipistrelle	4	C/F	Along river (too dark to see direction)
NJ 857 004	River Dee	Common + Soprano Pipistrelle	2	C	Along river (too dark to see direction)
NJ 856 005	River Dee	Common Pipistrelle	3	C	Along trees
NJ 854 005	River Dee	Daubenton's / Common + Soprano Pipistrelle	9	C/F	Over river and river edge

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Grid Reference	Habitat	Species	Number of Bat Passes	Activity ³	Notes
NJ 853 006	River Dee	Common Pipistrelle	6	C/F	River edge
NJ 859 004	River Dee	Common Pipistrelle	3	C/F	Along river edge (too dark to see direction)
NJ 860 004	River Dee	Common Pipistrelle	9	C/F	Along river edge / verge (too dark to see direction)
NJ 860 005	River Dee	Common Pipistrelle	4	C	Along river edge / verge (too dark to see direction)
NJ 861 006	River Dee	Common Pipistrelle	5	C/F	Along river edge / verge (too dark to see direction)
NJ 862 007	River Dee	Common Pipistrelle	8	C/F	Along river edge / verge (too dark to see direction)
NJ 858 004	River Dee	Daubenton's + Common Pipistrelle	30+	F	All over river
NJ 851 011	Milltimber	Common Pipistrelle	5	F	Foraging around street light
NJ 854 010	Milltimber	Common Pipistrelle	1	c	Following road line
NJ 851 011	Milltimber	Soprano Pipistrelle	3	F	Foraging around street light
NJ 850 010	Milltimber	Common Pipistrelle	1	C	Commuting along road
NJ 849 009	Milltimber	Pipistrelle sp.	1	F/C	Along A93 near woodland
NJ 854 010	Milltimber	Pipistrelle sp.	1	C	Following Deeside Old Railway Line
NJ 850 011	Milltimber	Pipistrelle sp.	1	C	Following trees/hedge at 6m, fast.
NJ 852 009	Deeside Old Railway Line	Soprano Pipistrelle	10	F/SC	Two bats chasing each other near woodland at 2m
NJ 851 009	Deeside Old Railway Line	Soprano Pipistrelle	7	F/SC	At least three bats foraging and social calling at 2-4m
NJ 850 008	Deeside Old Railway Line	Soprano Pipistrelle	2	F/SC	Two bats chasing each other 2-3m
NJ 852 009	Deeside Old Railway Line	Soprano Pipistrelle	2	F	One bat 2-3m
NJ 855 010	Deeside Old Railway Line	Common Pipistrelle	1	F	Along railway at 2m
NJ 857 011	Deeside Old Railway Line	Soprano Pipistrelle	1	F	Along railway at 2m
NJ 859 012	Deeside Old Railway Line	Soprano Pipistrelle +1 common	8	F	Around trees 2m
NJ 856 011	Deeside Old Railway Line	Common Pipistrelle	2	F	Along line at 3m
NJ 856 007	Camphill	Common Pipistrelle	2	F	Along road at Camphill
NJ 853 009	Deeside Old Railway Line	Soprano Pipistrelle	100+	F	Deeside Old Railway Line
NJ 850 010	N. Deeside Road	Soprano Pipistrelle	2	C	Flying southwest at 4m
NJ 849 010	N. Deeside Road	Soprano Pipistrelle	2	C	Following road

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Grid Reference	Habitat	Species	Number of Bat Passes	Activity ³	Notes
NJ 851 011	N. Deeside Road	Soprano Pipistrelle	1	C	Following road at 5m
NJ 857 006	Road	Common Pipistrelle	1	C	Along road edge
NJ 856 008	Road	Common Pipistrelle	6	C/F	Along road edge / trees
NJ 856 008	Woodland	Common Pipistrelle + soprano Pipistrelle	2	C	Edge of woodland
NJ 850 007	Camphill	Soprano Pipistrelle	30+	F	Constant, Camphill bungalow west end of office complex
NJ 853 008	Camphill	Soprano Pipistrelle	30+	F	Back of St Hilda's (over forest edge)
NJ 853 008	Camphill	Soprano Pipistrelle	30+	F	Front of Witiko dormitory
NJ 854 008	Camphill	Soprano Pipistrelle	30+	F	Front of Beltane dormitory

Section SL4

- 3.2.22 Section SL4 contains eight Habitat Areas. This section is characterised by residential areas (i.e. Milltimber) and surrounding woodland and gardens in the south, with the majority of the remaining section being grazed and arable fields, with some areas of scrub to the north. Linear features such as stone walls, hedgerows, shelter belts, tracks and gorse lined field boundaries are abundant. Aquatic habitats include mainly ditches / field drains.
- 3.2.23 As mentioned previously, individual survey of all the properties within the study area in Milltimber was not attempted. Seven roosts were identified during day surveys, however only three of these had emergence surveys carried out. No bats were observed emerging during surveys at Airy Park Cottage or Beanshill House. However, a pipistrelle and brown long-eared roost were confirmed at The International School. Two roosts within Milltimber were identified by the Aberdeen Bat Group (Table 5). A further 13 potential building roosts were identified (two of these were subject to emergence surveys, but no bats were seen emerging). This section of the study area also includes many trees with high roost potential, in particular within Milltimber and on tree lined roads and woodlands to the immediate north.
- 3.2.24 The night survey results from activity, commuting and emergence surveys confirm that much of this section provides high value foraging and commuting habitat, especially in sheltered areas around Milltimber and around woodland and buildings at Guttrie Hill and Beanshill, and is likely to support many bats in the region. The level of activity also indicates the quality of habitat in particular edge habitat and a mosaic of habitat types, and the generally low levels of disturbance. Foraging and commuting activity was recorded throughout Milltimber and along tree lined roads and tracks nearby. Potential commuting routes were also identified along the field edge running east to west from Bloomfield and along the road adjacent to Hill Farm but these require a survey to confirm their use.
- 3.2.25 All of the bat passes recorded were common or soprano pipistrelle, although a brown long-eared bat was recorded emerging from the International School. The number of bat passes recorded was 430+. Of this, 381+ passes were made by foraging bats (of which 23 were social calling), 25 were made by commuting bats and 32 were a combination of foraging and commuting passes.
- 3.2.26 The results from Section SL4 are shown in Table 12 and Table 13, and in Figures 25.4d–e and 25.5d–25.5e.

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Table 12 – Specific Features in Section SL4

Habitat Area	Feature	Feature Type	Description / Additional Information
S32	East Peterculter and western Milltimber	Commuting and foraging habitat, four roosts, potential building and tree roosts.	Amenity grassland dominates the habitat within this HA, although 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 providing sheltered foraging habitat of medium to high value. Linear features including access roads, tree avenues and woodland edges offer abundant commuting habitat. Large sports complexes, schools, nursing homes and hotels dominate the built environment. Although not all buildings in Milltimber were surveyed (as per paragraph 2.6.4), many standalone buildings within this area were surveyed during the day and higher survey effort was put in place during the evening to identify possible roosts. Three properties were identified as roosts on day survey at West Lodge, Culter Lodge and the International School, however only one was subject to emergence survey which confirmed the presence of a roost of common pipistrelles and possibly brown long-eared bats at the International School. Aberdeen Bat Group indicated the presence of another roost within this area (Table 5). A further nine properties were identified as being potential roosts on day survey, four of which require emergence surveys. Ten groups / areas of trees have been identified within the area that have high roost potential. Despite this, activity surveys confirm that this Habitat Area provides high value foraging, commuting and roosting habitat, with much commuting and foraging along and within established gardens with mature trees, tree avenues and areas of woodland. The proximity of this Habitat Area to Peterculter where the Aberdeen Bat Group has recorded many roosts indicates that bats from these roosts may be using this Habitat Area for foraging and commuting.
S33	Milltimber	One known roost, further potential roosts, foraging and commuting habitat.	This Habitat Area consists of relatively large dwelling houses with gardens – many with mature scattered trees as a border. As previously indicated, due to the sensitive nature of the proposal individual survey of properties was not attempted. Based on general observation and on activity survey results it is likely that this area includes a number of roosts. The Aberdeen Bat Group also provided a record of a known roost within this area (Table 5). Due to lack of access assessment of tree roost potential was not possible, but based on general observation it is likely that some of the trees within this area are used as roosts. The mature gardens and abundance of a variety of tree species indicate that foraging habitat value is likely to be high. Similar to S32 footpaths, minor roads, and woodland edges provide commuting habitat.
S34	Guttrie Hill	Foraging and commuting habitat, one building roost, potential tree roosts.	This area is dominated by conifer plantation woodland with low inherent value to foraging bats. The western area of the woodland contains abundant broadleaves and a well developed ground flora, and has higher foraging value:cliff / quarry areas with no roost potential. The presence of tracks, rides and the woodland edges (including along the road) is likely to provide high value commuting habitat, and provide connected to other Habitat Areas of value. Many of the trees in the broadleaved woodland have been identified as having high roost potential, whilst many of the trees in the conifer plantation to the west have been assessed as having some roost potential. One building roost was identified in this area at Bloomfield, however an emergence survey has yet to be carried out to confirm roost status. Activity survey on the south edge along Culterhouse Road recorded four commuting and four foraging pipistrelles.
S35	Milltimber Wood	Foraging and commuting habitat, potential building and tree roosts.	Scots pine plantation with birch edges. On the west side an area of woodland has been felled and offers little habitat of value due to its exposed nature. The remaining woodland provides commuting and foraging habitat of high value, however assessment for potential tree roosts indicated only a few trees on the woodland edge with roost potential. One property (Croft House) was surveyed within this area and identified as a potential roost, however no bats were recorded emerging on the night of survey. Activity surveys revealed common and soprano pipistrelles foraging along the woodland edges. Activity recorded during the emergence survey at Croft House indicated high levels of foraging activity around the shelterbelt and trees in the

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Habitat Area	Feature	Feature Type	Description / Additional Information
			garden by common and soprano pipistrelles. A probable Daubenton's bat was recorded passing over the shelterbelt on the western edge of this Habitat Area.
S36	Agricultural fields around Nether Beanshill	Foraging and commuting habitat, potential roosts.	A mixture of arable and improved fields with shrubs / gorse lining many of the fields and occasional small pockets of woodland. A large shelter belt containing mature Scots pine – plus a variety of other conifers and broadleaves – is present. These features are likely to provide foraging habitat of medium value. Walls divide fields across the majority of the Habitat Area, and an avenue of mature beech border Culterhouse Road in the southern part of this HA. These linear features together with the areas of woodland / shelter belts are likely to provide commuting habitat of high value, connecting to areas of higher foraging value such as Guttrie Hill (S34), and the woodland by Garden House to the immediate east of the study area. Several trees / stands of trees have been identified as having some to high roost potential. Day survey identified one high potential building roost at Garden House, and two low potential building roosts. Commuting surveys confirmed the presence of commuting routes within this Habitat Area. Bats were also recorded commuting and foraging along the northern edge of this Habitat Area as per S37 and S38.
S37	Woodland from Hill Farm to Westfield Lodge	Two roosts, One potential tree and building roosts, commuting and foraging habitat.	Connected woodland / scrub with varying structure. The habitat is predominantly conifer plantation in the north and south of the area. The area is likely to provide foraging habitat of medium to high value, especially given its strategic location as a potential stepping stone between high value foraging and roosting habitat in Milltimber and other important habitat to the north including Silver Burn (S41 and S42). Several stands of trees within this area have been assessed as having some to high roost potential. The area includes two building roosts, one of which is an anecdotal historic roost at Beanshill House, with the other at Airy Park Cottage, and one potential roost which requires emergence survey. A further property requires daytime assessment. Activity, commuting and emergence survey recorded many soprano and common pipistrelles foraging and commuting within this area, particularly in the gardens, along hedgerows, between buildings, and along Contlaw Road. The conifer plantation in the east of this area was not subject to night survey.
S38	Improved fields	One roost, foraging and commuting habitat.	Series of improved fields with pockets and field borders of gorse scrub. Walls line many of the fields. While much of this area is relatively open and exposed, the scrub / wall field boundaries are likely to provide commuting routes and foraging habitat of medium value. The area includes several drains which may provide a foraging resource of medium to high value. The area includes a building roost identified on day survey at Upper Beanshill, however an emergence survey has yet to be carried out. Activity and commuting surveys within the area confirmed the presence of commuting routes along linear features as indicated above. Soprano and common pipistrelles were recorded foraging around trees / gardens and hedges within the area and around the edges of S38, confirming the presence of suitable foraging habitat
S39	Beans Hill	Commuting and foraging habitat.	Acid grassland is dominant in this area, although dry heath is also present. Gorse is scattered occasionally around the area. Wall-enclosed, sheep-grazed, improved grassland is dominant to the east with occasional trees. Beans Hill is relatively exposed and there is little shelter, which will reduce habitat value to bats. Areas of woodland, scrub and gorse lined field boundaries are likely to provide foraging and commuting habitat of medium value. Activity surveys largely covered the margins of this area and confirmed the presence of foraging common and soprano pipistrelles over many of the features.

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Table 13 – Bat Activity Results for Section SL4

Grid Reference	Habitat	Species	Number of Bat Passes	Activity ⁴	Notes
NJ 854 012	N. Deeside Road	Common Pipistrelle	1	F	Along North Deeside Road.
NJ 854 013	Milltimber	Soprano Pipistrelle	1	F	Along track at ~3m.
NJ 853 014	Milltimber	Common Pipistrelle	5	F	Along track 3-5m.
NJ 854 015	Milltimber	Soprano Pipistrelle	5	F	Along road at tree height.
NJ 854 015	Milltimber	Soprano Pipistrelle	4	F	Along road.
NJ 855 015	Milltimber	Common Pipistrelle	1	F	Along road.
NJ 856 015	Milltimber	Soprano Pipistrelle	1	F	Flying at ~ 5m.
NJ 857 015	Contlaw Road	Common Pipistrelle	1	F	Flying from north to south along Contlaw road.
NJ 858 014	Milltimber	Common Pipistrelle	2	F	Beside pill box.
NJ 856 013	N. Deeside Road	Soprano Pipistrelle	3	F	All heights along trees on North Deeside road.
NJ 856 013	Milltimber	Soprano Pipistrelle	1	Crossing road	Flying south to north.
NJ 855 013	Milltimber	Soprano Pipistrelle	2	F	Around trees along North Deeside Road
NJ 854 014	Track	Soprano Pipistrelle	6	F	All heights more than two bats on track.
NJ 852 015	Culter House road	Common Pipistrelle	1	F	Culter House road at corner by East Lodge.
NJ 848 015	Pond, Kippie Lodge Golf Course	Soprano Pipistrelle	2	F	Two bats foraging over pond, Kippie Lodge golf course.
NJ 847 014	Culter House Road	Soprano Pipistrelle	2	F	Two bats along tree lined driveway to Culter House.
NJ 846 014	Culter House Road	Common Pipistrelle	30+	F	Continuous passes.
NJ 845 014	Culter House Road	Common Pipistrelle	1	F	Fork in road.
NJ 845 014	Woodland	Common Pipistrelle	1	F/C	In wood flying east to west.
NJ 847 014	Culter House Road	Common Pipistrelle	30+	F	Continuous passes along drive.
NJ 849 015	Culter House Road	Soprano Pipistrelle	3	F chasing +	Two bats flying at 6-7m along tree lined driveway to Culter House.
NJ 853 015	Culter House Road	Common Pipistrelle	3	F	Two bats flying high, Culter House Road.

⁴ C= Commuting, F=Foraging, SC=Social Calling

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Grid Reference	Habitat	Species	Number of Bat Passes	Activity ⁴	Notes
NJ 854 015	Milltimber	Common Pipistrelle	30+	F	Continuous passes over gardens.
NJ 853 011	Milltimber	Pipistrelle sp.	1	C	Along road
NJ 849 010	Milltimber	Common Pipistrelle	2	F/C	Crossing road.
NJ 847 010	Milltimber	Pipistrelle sp.	3	F	In housing estate
NJ 854 012	Milltimber	Pipistrelle sp.	2	C	Along A93
NJ 853 011	Milltimber	Common Pipistrelle	2	F/C	Deeside Old Railway Line
NJ 848 010	Milltimber	Pipistrelle sp.	1	C	Along tree line
NJ 848 010	Milltimber	Common Pipistrelle	6	F	Many bat passes foraging around trees
NJ 847 011	Milltimber	Common Pipistrelle	7	F	Many bat passes foraging around trees
NJ 853 014	Milltimber	Common Pipistrelle	3	F/C	Flying south, low.
NJ 854 014	Milltimber	Soprano Pipistrelle	1	F/C	Flying at 3m, travelling west in front of BT building.
NJ 854 014	Milltimber	Pipistrelle sp.	1	C	Flying at 2m travelling west 20m after BT building.
NJ 857 014	Milltimber	Common Pipistrelle	3	C	Three bats flying at ~ 5m, 60m from corner of road.
NJ 854 013	Milltimber	Common Pipistrelle	5	F	Foraging up and down lane ~10 - 15m.
NJ 857 014	Milltimber	Soprano Pipistrelle	2	F	Two bats foraging around mature trees at road edge, into garden.
NJ 857 014	Milltimber	Soprano Pipistrelle	1	C	Flying west up road.
NJ 855 014	Milltimber	Soprano Pipistrelle	1	C	Heading for big trees at south of house (northwest).
NJ 854 014	Milltimber	Soprano Pipistrelle	3	F	Outside house with pond and big trees ~10m Localised foraging.
NJ 852 015	Milltimber	Common Pipistrelle	1	C	Along tree-lined road
NJ 849 014	Road past golf course	Soprano Pipistrelle	1	C	Following tree-lined road west.
NJ 848 014	Road past golf course	Soprano Pipistrelle	1	C	Following tree-lined road west.
NJ 846 014	Road past golf course	Common Pipistrelle	1	C	Flying west > than 5m.
NJ 847 014	Road past golf course	Soprano Pipistrelle/ Common Pipistrelle	2	F	Flying at ~ 3m east and west following road.
NJ 851 015	Culter House Road	Common Pipistrelle	1	C	Following road.
NJ 851 016	Culter House Road	Common Pipistrelle	30+	F	Many passes, foraging around house with light on garage and around mature tree garden.

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Grid Reference	Habitat	Species	Number of Bat Passes	Activity ⁴	Notes
NJ 844 016	Culter House Road	Soprano Pipistrelle/ Common Pipistrelle	5	C55/F45	Soprano pip commuting east. Localised foraging around beech on edge of plantation.
NJ 843 016	Culter House Road	Common Pipistrelle	3	C	Along road
NJ 853 016	Woodland, Milltimber	unknown	1	F	Brief pass
NJ 855 016	Woodland, Milltimber	Common Pipistrelle	1	F	Brief pass
NJ 854 017	Woodland, Milltimber	Common Pipistrelle	1	F	Very faint /brief pass
NJ 852 018	Woodland, Milltimber	Pipistrelle sp.	1	F	Brief pass
NJ 851 019	Woodland, Milltimber	Common Pipistrelle	2	F	Brief pass
NJ 851 017	Woodland, Milltimber	Pipistrelle sp.	1	F	Brief pass
NJ 855 016	Woodland, Milltimber	Common Pipistrelle	1	F	Brief pass
NJ 855 017	Woodland, Milltimber	Common Pipistrelle	4	F	Brief passes
NJ 855 017	Woodland, Milltimber	Common Pipistrelle	7	F	Circling overhead at 6m
NJ 852 019	Woodland, Milltimber	Common Pipistrelle	1	F	Brief pass
NJ 851 018	Woodland, Milltimber	Common Pipistrelle	1	F	Very faint
NJ 851 017	Woodland, Milltimber	Common Pipistrelle	3	F	Brief passes flying west at ~ 8m
NJ 852 016	Woodland, Milltimber	Common Pipistrelle	1	F	Brief pass
NJ 852 016	Woodland, Milltimber	Common Pipistrelle	4	F	Swarming
NJ 852 015	Woodland, Milltimber	Common Pipistrelle	30+	F	Many passes
NJ 853 015	Woodland, Milltimber	Soprano Pipistrelle	1	F	Foraging around trees
NJ 848 009	Road	Soprano Pipistrelle/ Common Pipistrelle	11	C/F/SC	Three soprano pipistrelles commuting and three foraging / one common pipistrelle commuting, three foraging and one social calling 3-4m (south).
NJ 853 012	N. Deeside Road	Common Pipistrelle	3	C	Along North Deeside Road
NJ 854 013	Road	Common Pipistrelle	6	F/C	Flying at 10m
NJ 855 012	N. Deeside Road	Common Pipistrelle	1	C	Flying at 5m
NJ 855 012	Road	Common Pipistrelle	4	C/F	Flying south at 3-5m

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Grid Reference	Habitat	Species	Number of Bat Passes	Activity ⁴	Notes
NJ 854 011	Road	Soprano Pipistrelle/ Common Pipistrelle	2	C	Flying at 5m
NJ 854 012	Road	Soprano Pipistrelle	3	F/C	Flying at 10m two foraging /one commuting.
NJ 854 011	Road	Soprano Pipistrelle	1	F	Flying northwest at 3-4m.
NJ 855 012	Road	Soprano Pipistrelle	2	F	Not seen
NJ 856 013	N. Deeside Road	Pipistrelle sp.	2	F	Not seen
NJ 857 013	N. Deeside Road	Common Pipistrelle	2	F	Flying at 3-4m
NJ 854 012	N. Deeside Road	Pipistrelle sp.	1	F	Not seen
NJ 853 011	Road	Pipistrelle sp.	1	F	Not seen
NJ 854 012	N. Deeside Road	Soprano Pipistrelle	1	F	Not seen
NJ 853 012	N. Deeside Road	Soprano Pipistrelle	2	F	Not seen
NJ 854 012	N. Deeside Road	Soprano Pipistrelle	1	F	Not seen
NJ 856 013	N. Deeside Road	Common Pipistrelle	1	F	Not seen
NJ 854 010	N. Deeside Road	Pipistrelle sp.	1	F	Not seen
NJ 857 013	N. Deeside Road	Common Pipistrelle	1	F	Not seen
NJ 854 012	N. Deeside Road	Common Pipistrelle	1	F	10-12m
NJ 853 011	Road	Common Pipistrelle	1	C	Along road edge.
NJ 844 014	Brideward Wood	Soprano Pipistrelle	3	F	Flying west and east at 5m in understorey of Bridesward wood below golf course, on west - east path.
NJ 846 014	Brideward Wood	Common Pipistrelle	2	F	Flying along woodland edge in both directions. Detected from tarmac road southeast of Bridesward.
NJ 846 014	West lodge North side	Common Pipistrelle	2	F	Flying east and west along woodland edge.
NJ 846 013	Mature grounds of West lodge	Common Pipistrelle	1	F	Flying around southeast side of grounds at West lodge.
NJ 845 013	On track from West Lodge to Culter house	Common Pipistrelle	2	F	Flying in both directions along wood edge.
NJ 846 012	Southern Comfort	Common Pipistrelle	2	F	Flying along wood edge on northeast side of Southern Comfort.
NJ 846 011	Southern Comfort	Common Pipistrelle	2	F+SC	Flying northwest and southeast along wood edge on the southwest side of Southern Comfort.
NJ 847 010	Tree line, Culter Lodge	Common Pipistrelle	1	F	Tree line outside Culter Lodge on main track.

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Grid Reference	Habitat	Species	Number of Bat Passes	Activity ⁴	Notes
NJ 847 011	Tree line, Culter House	Common Pipistrelle	3	F	Flying northeast and southwest along treeline on Culter House track at 1.75m.
NJ 847 012	Culter Lodge	Common Pipistrelle	1	F	On northeast side outside Culter Lodge.
NJ 847 012	Culter Lodge	Common Pipistrelle	3	F	On northwest side outside Culter Lodge.
NJ 847 012	Culter Lodge	Common Pipistrelle	1	C	On southeast side outside Culter Lodge.
NJ 851 038	Gairnhill Wood	Common Pipistrelle	4	F	East and west past field boundary.
NJ 853 035	Westfield Cottage	Soprano Pipistrelle	3	F	Northwest of Westfield Cottage.
NJ 851 036	Track	Soprano Pipistrelle	2	F	West of track.
NJ 848 034	Southside Beanshill wood	Common Pipistrelle	3	F	10m Southside Beans Hill Wood.
NJ 846 033	Beanshill Wood	Common Pipistrelle	5	F	Flying west and east at 2m on the south side of Beanshill Wood.
NJ 846 027	Woodland	Common Pipistrelle	2	F	Flying east to west along road in small woodland.
NJ 849 027	On track toward West Lodge	Soprano Pipistrelle	3	F	One bat foraging along hedge at 2.5m.
NJ 850 027	On track toward West Lodge	Soprano Pipistrelle	3	F	One bat foraging along hedge 2.5m.
NJ 847 034	Woodland	Soprano Pipistrelle	2	F	Around trees in wood.
NJ 847 033	Trees	Common Pipistrelle	6	F	Around trees at top of drive.
NJ 852 031	On track toward West Lodge	Common Pipistrelle	5	F/C	Foraging at 3m, northeast/southwest along track.
NJ 846 027	Road	Common Pipistrelle	1	C	Flying west to east along main road.
NJ 845 027	Road	Common Pipistrelle	1	C	Flying west to east along main road.
NJ 845 027	Edge of field	Common Pipistrelle	5	F	Foraging in all directions along edge of field and woodland at 3m.
NJ 846 029	Road	Common Pipistrelle	30+	F	Two to three bats continuously foraging at tree height (5-7m) around turning circle.

Section SL5

- 3.2.27 Section SL5 contains six Habitat Areas. This section of the study area is dominated by a mixture of arable/grazing fields with conifer and broadleaved woodland to the east at Kingshill and Gairnhill Woods. Silver Burn is located to the south of this section and has associated woodland / wet woodland and marshy habitat including Rotten O'Gairn DWS. The Moss of Auchlea provides additional foraging habitat.
- 3.2.28 The section includes four roosts (two pipistrelle roosts, other two were not surveyed) and a further 14 potential roosts, four of which require emergence surveys. A day survey of one property has yet to be carried out. Three Habitat Areas contain trees with high roost potential: within Gairnhill

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Wood, along the road edge north of Silver Burn House and in the woodland to the south of Gairnhill Wood.

- 3.2.29 Activity, commuting and emergence survey data confirm the presence of habitat of high value for bats within this area. A number of active commuting routes have been identified, including along the Silver Burn road, the track north towards Kingswells, minor tracks within Gairnhill Wood and Kingshill Wood, the track down to Moss of Auchlea, and the track past Ben View. The majority of activity recorded was attributed to common and soprano pipistrelles, however brown long-eared bats were recorded in three separate locations. Potential commuting routes still to be surveyed include the access track to Moss-side of Auchlea, the access road/track from Tigh na Bruaich to the A944 and part of the track adjacent to Gairnhill Wood. These will have to be surveyed in the future to determine their use.
- 3.2.30 Surveys recorded 114+ bat passes within this section. Of these passes, 104+ were foraging bat passes (of which six included social calls) and nine were common/soprano pipistrelle commuting passes. One common pipistrelle was recorded emerging from a roost at Silver Burn House and at least three passes were recorded for foraging brown long-eared bats.
- 3.2.31 The results from Section SL5 are shown in Table 14 and Table 15, and in Figures 25.4e–g and 25.5e–g.

Table 14 – Specific Features within Section SL5

Habitat Area	Feature	Feature Type	Description / Additional Information
S40	Agricultural fields around Silver Burn	One confirmed roost, potential roosts, foraging and commuting habitat.	Improved fields with abundant marshy grassland and rocky outcrops dominate. The small channel of the Silver Burn runs through the area. There are many linear features within this area and it is likely to provide commuting and foraging habitat of high value. There is one confirmed roost at Silver Burn House which was not subject to a full emergence survey, however a common pipistrelle was observed emerging during an activity survey and many droppings were identified during the day. One potential roost (category 2a), and one property that has yet to be surveyed were also identified. Due to lack of access and grazing stock, activity surveys were carried out from the public road / tracks. A number of bats were recorded foraging and commuting along the main road through Silver Burn as detailed in S41 and S42. No potential tree roosts were recorded within this Habitat Area. A culvert with low roosting potential was identified along Gairn Burn.
S41	Silver Burn Wood	Foraging and commuting habitat, potential tree roosts.	The part of this Habitat Area that lies within the study area is primarily conifer woodland edged with mature beech along the main road. The mature beech trees have been assessed as having high overall roosting potential. This woodland forms part of a wider area of high value to bats which incorporates a green corridor from Bieldside up Murtle Den and Gairnhill Wood, and is likely to provide commuting habitat and foraging habitat of medium value. A culvert under the road is assessed as having low roosting potential. Activity survey covered the short north border of this area, and recorded common and soprano pipistrelles commuting and foraging along the woodland edge.
S42	East Silver Burn	Foraging and commuting habitat, potential roosting and one roost.	Improved/semi-improved grasslands with frequent areas of species poor marshy grassland. Also includes mixed woodland including wet woodland. One anecdotal roost was recorded at Ard na Moine, which requires emergence survey. Two potential building roosts were identified within this area, neither of which were confirmed as roosts during emergence surveys. Silver Burn flows through a culvert with low roosting potential. Activity, commuting and emergence surveys confirm the high value habitat in this general region. Common and soprano pipistrelles as well as brown long-eared bats were recorded foraging and commuting in this sheltered area, which is subject to relatively low disturbance levels despite the presence of the road, and which is strategically situated on a green corridor which includes Kingshill and Gairnhill Woods and habitats outwith the study area to the east including Murtle Den. The emergence survey at East Silver

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Habitat Area	Feature	Feature Type	Description / Additional Information
			Burn in particular recorded a high level of foraging and commuting activity by common and soprano pipistrelles.
S43	Gairnhill and Kingshill Wood	Foraging and commuting habitat, potential tree roosts.	Plantation conifer woods dominate with some beech. This Habitat Area is a large continuous feature and likely to be closely associated with features to the east of the study area including Murtle Den, and to the west including Silver Burn. The area is subject to low levels of disturbance. Linear features such as woodland edges, tracks and rides provide commuting habitat of high value. Foraging habitat value is likely to vary according to planting, and is likely to be medium to high in value along the edges and in broadleaved stands. An area of mature beech has been identified as having high roosting potential. Activity surveys confirm the high value habitat as predominantly common and soprano pipistrelles were recorded commuting and foraging in the area, with the majority of activity recorded in the western and southern parts of the area. Five brown long-eared foraging bat passes were recorded along the west side of Gairnhill Wood.
S44	Agricultural fields to the west of Kingshill Wood	Two roosts, further potential roosts, foraging, and commuting habitat.	This area is dominated by improved and arable fields. Walls are dominant feature of the borders between fields with occasional gorse. The area includes several field drains / ditches with associated marshy habitat west of Gairnlea in the south of this area. The southern part of the Habitat Area is generally more sheltered and is in close proximity to / offers higher quality habitat for foraging and commuting bats around Silver Burn as per S41 and S42. The northern part of the Habitat Area is quite exposed with few features offering shelter or foraging potential, and is bordered by a major road. The Moss of Auchlea (S45) is positioned in the centre of this Area, and is connected to Kingshill Wood (S43) by linear features including tracks, scrub and walls passing through this area. The Habitat Area includes two roosts identified on day survey – one of which (Moss side of Auchlea) was confirmed during emergence survey, the other of which, at Back Hill of Brodiach, requires an emergence survey. There are a further 11 properties (some with multiple buildings) identified as potential roosts, however four of these were subject to evening survey and no bats were observed emerging (three require emergence survey). Data from activity, commuting and emergence surveys indicates that the Habitat Area is well used by bats, particularly around the Moss of Auchlea (as per S45), along linear features and scarce trees and near Kingshill Wood and Silver Burn, although survey effort was concentrated on the edges of the area. The majority of bats recorded were common and soprano pipistrelles, although brown long-eared bats were recorded foraging in the gardens of Gairn Farm. Data indicates that bats are using features to commute across the identified study area.
S45	Moss of Auchlea	Foraging area, commuting route.	Area of willow scrub on wet grassland with some immature birch. Swamp, marsh and field drains also exist, providing excellent foraging potential and abundant insect prey in sheltered and undisturbed surroundings although roost and commuting potential are low. A soprano pipistrelle bat roost for at least three bats was identified at Moss Side of Auchlea, adjacent to the moss, as per S44. The bats emerging from this roost were observed commuting directly to the moss and foraging around the edges. Common and soprano pipistrelle bats were also observed foraging and commuting along the northern edges of the moss and two common pipistrelle bats were recorded foraging around a tree in the garden at Moss Side of Auchlea.

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Table 15 – Bat Activity Results for Section SL5

Grid Reference	Habitat / location	Species	Number of Bat Passes	Activity ⁵	Notes
NJ 852 043	Rotten O'Gairn carpark	Common Pipistrelle	1	C	By Rotten O'Gairn carpark
NJ 853 042	Track	Common Pipistrelle	2	F	Flying north and south at 3m, 100 m down track south of road.
NJ 854 041	Track	Common Pipistrelle	5	F	Flying northwest and southeast at 4-5m, 100m down track.
NJ 850 039	Plantation	Common Pipistrelle	6	F	Flying east and west towards end of plantation.
NJ 851 044	Carnhill	Common Pipistrelle	2	C	3m above tree tops by road junction.
NJ 847 044	Silver Burn House	Common Pipistrelle	1	C	One bat observed emerging from roost pre-activity survey then flying away.
NJ 847 046	Silver Burn wood	Common Pipistrelle	6	F/SC	Three bats chasing around clearing at 5 -7m.
NJ 847 045	Road	Common Pipistrelle	4	F	Two bats foraging at 3m along road and over burn, beside Silver Burn Wood.
NJ 849 044	Road	Soprano Pipistrelle	2	F	Two bats foraging at 2m along road and over burn, Silver Burn Wood.
NJ 851 044	Corner of Gairnhill	Brown long-eared	3	F	Ground level bat foraging low over road and verges.
NJ 852 046	Edge of Gairnhill wood	Common Pipistrelle	3	F	One bat foraging along edge of broadleaved area within wood at 2-3m.
NJ 854 051	Kingshill / Gairnhill wood	Soprano Pipistrelle	3	F	One bat at 4m along forest edge.
NJ 855 047	Garnhill	Soprano Pipistrelle	2	C	Flying east to west along forest ride.
NJ 852 046	Garnhill	Soprano Pipistrelle	2	F	Flying north to south at 2m along edge of forest.
NJ 852 044	Edge of Gairnhill on road	Soprano Pipistrelle	4	F	Foraging at 3-4m overhead up and down road.
NJ 853 042	Clearing in Barn hill S. of road	Soprano Pipistrelle	3	F	Foraging in circles around edges of clearing higher than 5m.
NJ 852 041	Garnhill Wood	Common Pipistrelle	3	F	At edge of felled area.
NJ 850 044	Silver Burn	Pipistrelle sp.	Unknown	n/a	Over tree by burn.
NJ 848 044	Silver Burn	Common Pipistrelle + brown long-eared	Unknown	F	Trees by road and open fields. Three common pipistrelles, five brown long-eared at 4.5m.
NJ 852 047	Gairnhill Wood	Brown long-eared	Unknown	n/a	Along closed canopy ride at ~ 5m.
NJ 853 055	Gairnhill Wood	Common Pipistrelle	unknown	F	Mixed mature broadleaf/ coniferous circling 6m+

⁵ C= Commuting, F=Foraging, SC=Social Calling

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Grid Reference	Habitat / location	Species	Number of Bat Passes	Activity ⁵	Notes
NJ 846 052	Silver Burn	Common Pipistrelle	1	C	Faint pass
NJ 847 053	Moss of Auchlea	Common Pipistrelle	17	F	Two bats flying east and west ~4m
NJ 849 055	Moss-side of Auchlea	Common Pipistrelle	8	F	One bat along track and over trees at edge of garden back and forwards –flying east and west.
NJ 854 048	Gairnhill Wood	Soprano Pipistrelle	1	C	Single bat commuting along ride/path – east to west.
NJ 855 056	Kingshill Wood	Soprano Pipistrelle	1	C	In woods, single pass.
NJ 848 055	Moss side of Auchlea	Common Pipistrelle	30+	F	Continuous foraging around tree in garden at 3-5m.
NJ 848 058	Farm access track	Common Pipistrelle	1	C	Flying west to east near junction.
NJ 848 055	Moss side house	Common Pipistrelle	3	F	Around trees at front of house.

Section SL6

- 3.2.32 Section SL6 includes 12 Habitat Areas (N5 is not included in the assessment as it lies outwith the study area). This section is characterised by extensive areas of arable and pasture farmland that has relatively low inherent value to bats as it is bordered by shelterbelts of mature mixed trees and fragments of mature broadleaved and mixed woodland of higher value, including West Hatton Wood and Fairley Home Farm Wood. An extensive area of conifer plantation and mixed woodland and gorse scrub exists at Brimmond Hill and an extensive area of potential roosting habitat exists at Kingswells, where a number of suitable residential properties suitable for roosting bats are likely to exist. Daytime surveys revealed the presence of ten roosts, of which three are in buildings (the Coach House at Cloghill, Fairley Home Farm and Derbeth Farm) and seven were identified in trees during 2004 surveys. These are considered to be small roosts belonging to pipistrelle bats, brown long-eared bats and *Myotis* sp, all of which are located in the shelterbelts and mature trees north of Fairley Home Farm and south of Hillhead of Derbeth. This indicates the overall value both strategically, due to their proximity to Kingswells, and between Kingswells and woodlands at Brimmond, and in terms of the resource provided, despite the generally fragmented nature of these habitats. A number of other suitable roost opportunities were identified in other trees and buildings, including the large residential area at Kingswells.
- 3.2.33 A further six potential building roosts were identified, one of which requires emergence survey. Total outstanding survey effort required includes five emergence surveys and 12 day surveys of properties.
- 3.2.34 Evening activity surveys revealed a wide range of species including soprano and common pipistrelles, brown long-eared and Daubenton's bats, with foraging activity centred along West Hatton Wood, Fairley Home Farm wood and shelterbelts. Commuting routes were identified along the edges of West Hatton Wood, along the shelterbelts at Cloghill and Dykeside and at farm access tracks near Fairley Home Farm.
- 3.2.35 The total number of bat passes recorded within Section SL6 is 143+. The majority of these were made by common and soprano pipistrelles. Of these passes, 116+ were recorded during the 2006 survey period and 27 were recorded during the 2004 survey period. The majority of passes observed were foraging passes. Five commuting bat passes were recorded along the tracks and field boundaries at Hillhead of Derbeth and West Hatton Wood. Natterer's bats were also recorded foraging constantly at the same time as soprano pipistrelle but the number of passes recorded is a

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combination of the two species. Brown long-eared bats were recorded foraging in 2004 and 2006 at Fairley House and near West Hatton Wood and Daubenton's bats were recorded over Borrowstone Pond.

3.2.36 The results from Section SL6 are shown in Table 16 and Table 17, and in Figures 25.4g–h and 25.5g–h.

Table 16 – Specific Features within Section SL6

Habitat Area	Feature	Feature Type	Description / Additional Information
S46	Agricultural fields to the north of the A944	One roost, potential roosts, foraging and commuting habitat.	<p>Extensive area of small improved and semi-improved fields with gorse and shrub borders, offering generally low potential for foraging, roosting and commuting.</p> <p>A historical bat roost (category 1b) was identified at the Coach House at Cloghill and the presence of droppings suggests that bats may continue to roost elsewhere in the building.</p> <p>A number of other farm buildings and houses within the area provide roost potential (category 2a – Cloghill House 2b – East Kingford Cottage, caravan park). A mature ash tree also provides some potential for roost near Westholme (Category 2a) and a category 2b tree exists adjacent to Cloghill House.</p> <p>Four soprano pipistrelles were recorded in the south of this section near Kingswells House in 2004, soprano pipistrelle and common pipistrelle were recorded foraging along an access track near Denhead of Cloghill and a common pipistrelle bat was observed commuting along a minor road near the edge of West Hatton Wood (HA47). Brown long-eared bats were observed along an access track during 2004 bat activity surveys. Outstanding survey work required includes two emergence surveys and three day surveys.</p>
S47	West Hatton Wood DWS	Foraging area and potential commuting route and potential tree roosts.	<p>Open broadleaved woodland dominated by birch, rowan and beech with grassland and gorse scrub ground flora. The woodland offers medium potential for roost in trees and high foraging and commuting potential around the edges. The woodland is strategically located close to the residential area of Kingswells, which is likely to contain a number of roosts.</p> <p>Soprano and common pipistrelle bats recorded foraging along the eastern edge of the woodland and along Consumption Dyke which connects the wood to Kingswells (2006 bat activity surveys)</p> <p>Brown long-eared bats observed foraging near the woodland (2004 bat activity surveys).</p>
S48	Cloghill	Potential foraging and commuting habitat.	<p>Habitat Area dominated by improved grassland with low inherent value to bats. Tree and shrub lined field boundaries and tracks offer high potential for commuting bats especially given the strategic location between Kingswells and potential foraging habitat in Woodlands at Brimmond. Scattered trees and scrub are present throughout offering medium potential for commuting and foraging bats but high exposure levels reduce its suitability for roosting bats.</p> <p>No bats were recorded during activity surveys in 2004 or 2006.</p>
N1	Kingswells	Potential roosts, foraging and commuting habitat.	<p>Kingswells includes shelterbelt plantation and localised areas of marshy grassland including along Bucks Burn with high potential for foraging and commuting. Bats are likely to use buildings in Kingswells for roosting (not surveyed). Whilst survey of the Kingswells Estate within the survey area was not attempted, outstanding effort includes day survey of Haywood in the north of this area.</p> <p>Pipistrelle bat commuting routes identified in 2004 and 2006 bat activity surveys lead from Kingswells to foraging areas to the west (N4).</p>
N2	Agricultural fields north of Cloghill	Foraging and commuting habitat, potential roosts.	<p>Extensive area of arable farmland incorporating shelterbelt woodlands with high potential for foraging and commuting. A number of mature beech, ash and rowan trees offer roost potential along the field boundaries in this area.</p> <p>Soprano pipistrelle bats were recorded along Borrowstone Burn and nearby treelines, a Daubenton's bat was recorded foraging over the</p>

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Habitat Area	Feature	Feature Type	Description / Additional Information
			pond (2004 bat activity surveys). Common pipistrelle commuting and foraging route exists along the farm access track to the east of the habitat area (2004 and 2006 activity surveys).
N3	Derbeth Farm and agricultural land around Fairley Home Farm	Roost (anecdotal), Foraging, potential roosting	Large arable fields with limited value to foraging bats away from shelter belts of mature broadleaved and Scots pine which connect Derbeth Woods and Dykeside and around Fairley Home Farm (see N4). Derbeth Farm has been identified as an anecdotal roost. The property of Grandview has been identified as a potential roost (2b). Foraging pipistrelle bats were recorded in the area during 2004 and 2006 surveys. Outstanding survey effort includes four day surveys and one emergence survey.
N4	Woodland at Fairley Home Farm and Derbeth Farm	One building roost, six tree roosts, potential roosts, foraging and commuting habitat	Series of shelterbelts and small mature and semi-mature woodland plantations located within N3 and strategically located close to the residential area of Kingswells which is likely to contain a number of roosts. Semi-natural broadleaved woodland and pond habitat present adjacent to Fairley Home Farm. Area has high potential for roosting, foraging and commuting bats. Daytime surveys identified a bat roost in the house at Fairley Home Farm (category 1b) as indicated by the presence of droppings under the eaves. The farm buildings have also been identified as a potential roost. A roost for unknown <i>Myotis</i> species was recorded in an ivy-covered stump adjacent to pond at NJ 859 077. A small brown long-eared bat roost was recorded in a mature beech tree at NJ 864 078. Additional tree roosts indicated by droppings were also recorded in a crevice in a beech tree (species unknown) and silver birch (probable common pipistrelle) at NJ 861 081. Two roosts in northern shelter belt: droppings (species unknown) in rotten limb of silver birch (NJ 862 083). Common pipistrelle roost in crack in Scots pine (NJ 862 085). Abundant common and soprano pipistrelle bat foraging activity observed along the edges of the shelterbelt and commuting and foraging along the farm access track. Brown long-eared bats observed around Fairley Home Farm and woods (2004 and 2006 bat activity surveys). Common pipistrelle bats observed displaying social behaviour in Fairley Home Farm Woods in 2004. Outstanding survey effort includes two day surveys and two emergence surveys.
N6	Woodland west of Hillhead of Derbeth Farm	Foraging area, potential roosting and commuting	Mosaic of coniferous plantation and semi-natural broadleaved woodland with some tree roost opportunities and localised areas of wet woodland suitable for foraging bats. Medium potential for foraging along the woodland edges. The woodland is strategically located adjacent to a commuting route at Dykeside (N7) which is likely to be of value to bats roosting in Kingswells by connecting the area to foraging opportunities at woodlands at Brimmond. Soprano and common pipistrelle bats recorded foraging along woodland edges and over a pond within the woodland (2004 bat activity surveys). A commuting route exists along the access track south of the woodland connecting the area to woodland and roost opportunities in Kingswells and Fairley Woods. Outstanding survey effort includes one building.
N7	Woodland and shelterbelt east of Hillhead of Derbeth Farm	Tree roost, commuting route, foraging area	Mosaic of coniferous plantation and semi-natural broadleaved woodland including and wide shelterbelts of mature broadleaved and Scots pine connecting area to Derbeth Woods and Dykeside and connecting the area to foraging opportunities at woodlands at Brimmond and Kingswells. Habitat assessed as being of high potential value to foraging and commuting bats and generally low potential for roosting. Bat droppings (species unknown) identified in a tree near Dykeside (NJ 864 087). Common pipistrelle bats observed commuting and foraging along tree line and foraging in the conifer plantation at Hillhead of Derbeth (2004 and 2006 bat activity surveys).

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Habitat Area	Feature	Feature Type	Description / Additional Information
N8	Scrub and bracken on lower slopes of Brimmond Hill - SINS	Foraging area	Area of gorse scrub with occasional scattered trees of low roost potential. Two common pipistrelle bats observed foraging along the edges of the scrub (2004 survey data).
N9	Dry heath on upper slopes of Brimmond Hill - SINS		Dry heath on upper slopes of Brimmond Hill provides limited potential for bats due to high levels of exposure.
N10	Agricultural fields south of C89c and Overhills Farm	Potential commuting along walls	Arable and improved grassland fields with dry stone walls of limited value to commuting bats due to high exposure levels.

Table 17 – Bat Activity Results for Section SL6

Grid Reference	Habitat	Species	Number of Bat Passes	Activity ⁶	Notes
NJ 863 078	N. Kingswells road	Common Pipistrelle	1	F	Along street lighting.
NJ 863 079	Tree lined track near Fairley House	Common Pipistrelle	2	F	Two bats along track flying < 4m.
NJ 862 080	Track north of Fairley House	Common Pipistrelle	7	F	Along wood edge.
NJ 862 081	Track north of Fairley House	Soprano Pipistrelle	2	F	Along wood edge.
NJ 862 085	Track north of Fairley House	Common Pipistrelle	4	F	Along wood edge.
NJ 868 087	Hedge-lined track	Common Pipistrelle	2	F	Along track.
NJ 864 087	Tree line east of hillhead of Derbeth	Common Pipistrelle	1	C	Along line of trees.
NJ 862 086	Tree line east of hillhead of Derbeth	Common Pipistrelle	3	F	Two bats along line of trees.
NJ 860 082	Track north of Fairley House	Common Pipistrelle	3	F	Along track next to trees.
NJ 861 081	Track north of Fairley House	Common + soprano Pipistrelle	30+	F	Three bats continuous passes along track.
NJ 860 080	Track north of Fairley House	Common Pipistrelle	1	F	Along woodland edge.
NJ 862 079	Track near Fairley House	Soprano Pipistrelle + Natterer's	30+	F	Along driveway – continuous passes.
NJ 859 072	Track near Denhead of Cloghill	Soprano Pipistrelle	6	F	Northeast to southwest on southwest corner of dog training field.
NJ 861 071	Track near Denhead of Cloghill	Common Pipistrelle	2	F	Southeast to northwest next to road.

⁶ C= Commuting, F=Foraging, SC=Social Calling

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Grid Reference	Habitat	Species	Number of Bat Passes	Activity ⁶	Notes
NJ 859 068	West Hatton Wood	Common Pipistrelle	3	F	West to east along Consumption dyke and along West Hatton wood at ~ 2m.
NJ 859 067	West Hatton Wood south	Common Pipistrelle	4	F	North to south at West Hatton wood, southern end at 1 - 5m.
NJ 858 067	West Hatton Wood	Common Pipistrelle	1	C	West Hatton wood, southern end.
NJ 852 071	West Hatton Wood	Common Pipistrelle	1	C	Along woodland edge.
NJ 858 070	West Hatton Wood, Northern end	Common + soprano Pipistrelle	5	F	Common pipistrelle recorded and chasing soprano pipistrelle Flying at 1 – 4m.
NJ 859 069	West Hatton Wood	Soprano Pipistrelle	8	F	Flying at 1.5 – 3m at West Hatton wood, eastern end.
NJ 859 063	Field boundary	Soprano Pipistrelle	4	F	2004 survey data
NJ 860 074	Track	Brown long-eared	2	F	2004 survey data
NJ 863 078	Track	Brown long-eared	1	F	2004 survey data
NJ 856 079	Track	Soprano Pipistrelle	1	F	2004 survey data
NJ 854 079	Track	Soprano Pipistrelle	1	F	2004 survey data
NJ 855 080	Track	Soprano Pipistrelle	1	F	2004 survey data
NJ 857 081	Borrowstone Pond	Daubenton's	1	F	2004 survey data
NJ 862 085	Field boundary	Common Pipistrelle	4	F	2004 survey data
NJ 861 085	Field boundary along track	Common Pipistrelle	2	C	2004 survey data
NJ 858 085	Track south of Hillhead of Derbeth	Common and soprano Pipistrelle	3	F	2004 survey data
NJ 857 086	Pond south of Brimmond Country Park	Common + soprano Pipistrelle	2	F	2004 survey data
NJ 863 087	Path	Common Pipistrelle	1	F	2004 survey data
NJ 856 081	Borrowstone Pond	Soprano pipistrelle	1	F	2004 survey data
NJ 855 084	Brimmond Hill field boundaries	Soprano pipistrelle	2	S	2004 survey data
NJ 863 088	Brimmond Hill scrub	Pipistrelles	2	F	2004 survey data

3.3 Survey Results Summary

3.3.1

A number of features of value to bats have been identified within the 54 Habitat Areas within the study area. The study area is dominated by a combination of large areas of open arable and pastoral farmland, which have limited roosting and foraging opportunities. However, it does include linear features such as hedgerows, shelter belts, burns / ditches, which provide important foraging and commuting habitats for a range of bat species present within the study area and in the wider landscape. There are also several areas of coniferous plantation and broadleaved woodlands, which are of higher value to bats and several rivers and burns of high value to bats. In addition to

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open countryside and rural features, the central section of the study area is characterised by the residential area of Milltimber with surrounding woodland and gardens. Throughout the study area, linear features such as stone walls, hedgerows, shelter belts, ditches and field drains, tracks and gorse lined field boundaries are abundant.

- 3.3.2 Several main areas of woodland are found spread throughout the study area. The most significant area, in terms of providing a range of woodland habitats, is found at Kingcausie where a wide range of tree species of varying ages are found within mature broadleaved, coniferous and mixed woodland and parkland. Outside the estate, large areas of coniferous plantation can be found at Duff's Hill, Greensgate, Clochandighter, Gairnhill Wood and Kingshill Wood. Smaller pockets of woodland and shelterbelts are found throughout.
- 3.3.3 Three main areas of flowing water are present in the centre of the study area. These are the River Dee, Crynoch Burn and Blaikiewell Burn. Other smaller burns and field drains are found throughout the study area.
- 3.3.4 Twenty-six bat roosts were identified in buildings within the 1km study area. Lochview Croft, Eastland, Eastland Cottage, Rumlin Fauld, The Coach House, Camphill House, The International School, Silver Burn House and Moss-side of Auchlea all had emergence surveys carried out and the species present identified. Properties including the garage at the house to the south of Mains of Charleston, Red Tile Lodge, cottage at Eastland Bridge, restaurant at Story Book Glen, Witiko in Camphill, Culter Lodge, West Lodge, Beanshill Steading, Ard-na-moine, outbuilding at Backhill of Brodiack Farm, Cloghill Coach House and Fairley Home Farm Steading, Derbeth Farm, The Old Mill Inn, and Newton were identified through day surveys or anecdotal evidence and require evening surveys to identify the species present. Airy Park Cottage and Beanshill House were identified as roosts but no bats were observed during emergence surveys. Aberdeen bat group have also identified two bat roosts within the study area at Milltimber and numerous roosts on either side of the corridor, particularly within Peterculter. The species present, numbers and exact locations of these roosts are unknown.
- 3.3.5 There are 82 buildings/ properties with potential to be used as roosts of which 19 have had emergence surveys carried out but no bats were observed emerging. Of the potential roosts, 25 require emergence surveys (those of 2b category do not require emergence surveys). In addition, 37 properties have had no day or evening surveys carried out on them to establish their value to bats.
- 3.3.6 Four culverts have been identified as having medium potential for roosting and numerous sites have been identified as having trees with roost potential.
- 3.3.7 A total of 1993+ bat passes were recorded. Of these passes 1765+ were foraging bat passes, 127+ were commuting bat passes, and 101+ passes were collectively recorded as commuting/ foraging. Sections SL3 and SL4 of the study area contain the highest concentration of bat activity and the lowest was in Section SL1. Areas of activity were concentrated in and around Kingcausie, the River Dee and its tributary, Crynoch Burn, as well as Milltimber.
- 3.3.8 Features of concentrated bat activity include the River Dee (constant activity on several evenings i.e. hundreds), Crynoch Burn and Storybook Glen (91 passes), the north entrance driveway into Kingcausie as far as farmsteading (69+ passes), Old Deeside Line (36+ passes), Camphill Estate (>100 passes), Milltimber and North Deeside Road (hundreds of passes), along the road and buildings south of Gairnhill Wood (33 passes plus activity recorded during emergence surveys) and along the mature tree lined track running north from Fairley House (75+ passes). Bats were also observed foraging, commuting and displaying social activity throughout the study area in largely predictable areas such as shelterbelts, woodland edges and roads/tracks away from these main areas of identified activity.
- 3.3.9 Identified commuting routes where bat activity was observed connecting habitat areas, along linear features include the access road to Sunnyside Steading, along the road adjacent to Whitestone, along Blaikiewell Burn, along the length of Crynoch Burn, on the north entrance driveway into

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Kingcausie as far as Philips cottage, along the River Dee, on the B979 from Milltimber to the River Dee and along North Deeside Road. Other commuting bats were recorded in smaller numbers along tree lines and other linear features throughout the study area.

- 3.3.10 The majority of observations were of soprano and common pipistrelle bats, which are the commonest bat species in the region. Brown long-eared bats, Natterer's and Daubenton's bats were also recorded. The Habitat Areas around Milltimber, the River Dee and Kingcausie recorded the largest range of species present in the study area. An incidental report of a sighting of two Leisler's bats was made towards the end of the survey season (July 2006) at Rumlins Fauld, a farm steading within Kingcausie. Based on current evidence, including previous records of Leisler's bat in Aberdeenshire, uncertainty about the size of the population in Aberdeen and its rarity in Scotland, particularly this far north, further surveys are being carried out during the 2007 survey period to determine the use of the habitats in this area by Leisler's bat.
- 3.3.11 Potential commuting routes were also identified along the road running south from Hillside, along the roads on the east and west of Hare Moss, along the road adjacent to Bishopton, along field boundaries between Hill of Blairs and Clochandighter, along the track from the road south of Cleanhill to Blaikiewell Farmhouse, along the Deeside Old Railway Line, along the field boundary running east from Bloomfield, the gorse-lined road adjacent to Hillfarm, along the track beside Gairnhill Wood, along the access track to Gairn Farm, along the road/track between Kingslea and Tigh na Bruaich, along the shelterbelt at Denhead of Cloghill, along the track from Cloghill House, along the shelterbelt to the south of Fairley Home Farm and the access track running northwest from Fairley House towards Brimmond Hill. These have not been surveyed in the evening to confirm their use by bats and surveys are being undertaken during the 2007 survey period.
- 3.3.12 All identified habitats of potential high value to foraging bats were surveyed during night-time activity surveys.
- 3.3.13 Daytime habitat assessment and evening emergence surveys revealed 33 roosts (building and tree roosts) and many more potential roost sites in structures and trees within the study area. Despite a thorough assessment of trees including a close examination of potential roost holes where these were accessible, relatively few potential tree roosts were identified in proportion to the number of trees surveyed (note that the 2006 survey effort did not include emergence surveys of potential tree roosts). Daubenton's bat roosts are likely to be located throughout the Dee Valley; although many of these roosts are thought to be in the upland reaches of the Dee valley, the River Dee is considered to be an important resource for this species (Rydell et al 1994). This appears to be confirmed by evening survey results.
- 3.3.14 Five (and one sighting of another species, Leisler's) of the seven bat species known to be or have been present in Aberdeenshire were observed during field surveys within the study area, exhibiting a range of behaviour including foraging, commuting and emerging from roosts. Bat activity was observed along the entire study area, with concentrated activity in certain predictable areas. Many landscape features such as tree-lined pathways and roads were used by species including common and soprano pipistrelle bats. High Daubenton's bat activity in relation to other bat species was observed around water features and wet woodland areas, while the majority of brown long-eared bat sightings were in the vicinity of buildings with mature trees. Natterer's bats were also observed foraging around buildings with mature trees. Due to the nature of call used by both of these species, it is possible that their detection has been easier during emergence surveys when the surveyor is standing in one area for a long period and has time to positively identify them rather than during an activity survey when it is more difficult to pick up and positively identify passing bats.
- 3.3.15 Foraging behaviour was observed in specific and predictable areas including at woodland edges and over water features such as burns and rivers (Walsh, 1996a and 1996b) and the lowest activity was observed in areas of high intensity arable agricultural land, improved pasture, open exposed hillside areas and areas isolated from roost opportunities or linear habitat features.

4 Evaluation of Habitat Areas

- 4.1.1 The Habitat Areas that were identified have been evaluated in the context of their actual or potential value to bats. Habitat Areas have been evaluated according to whether the site is an actual or potential bat habitat where R denotes roost or potential roost; C, commuting or potential commuting; and F, foraging or potential for foraging. Where bats were observed using a feature within a Habitat Area, the importance of the species and the size of the population were assessed and, where bats were not present, the value of the habitat was assessed, using the evaluation of ecological receptor indicators and methods described in Section 2.3 above.
- 4.1.2 The proposed scheme runs predominantly through agricultural land managed for pasture and arable farming, and some of the woodlands within the survey area are coniferous plantation, which are both considered to be generally of low value to bats, although Entwistle et al (2001) note that whilst not providing good roosting opportunities coniferous woodland can provide high insect abundance and provide foraging habitat for species including pipistrelles and brown long-eared bats. However, these areas do include features of value to bats, such as hedgerows, shelterbelts, stone walls, tracks / roads lined with vegetation, burns and ditches as reflected by the results of evening activity surveys. Many areas of suitable habitat including broadleaved woodland, tree lines and water features are important because of their inherent value for bats seeking insect prey or roost sites. They are also important strategically due to their position or location within the landscape. Each Habitat Area has been evaluated separately, but an overall summary value has been reached for each geographical section within the study area according to its value to bats.

Section SL1

- 4.1.3 Of the ten Habitat Areas identified within Section SL1, one has been assessed as being of regional importance due to the presence of two roosts. There are a limited number of high potential roosts in other Habitat Areas.
- 4.1.4 The remaining Habitat Areas have all been assessed as being of county value to bats on account of the presence of valuable commuting and foraging habitat (including Hare Moss) and / or potential roosts. Habitats in this section are not considered the most valuable in the whole study area due to the predominance of exposed arable and pasture farmland of low inherent value to roosting and foraging bats. Suitable shelter and foraging habitat including woodland, wet habitats and scrub are generally small, patchy and fragmented. The importance of these features as a whole, in particular their role in providing connecting habitat between more valuable areas outwith the study area, confirm the importance of the area in supporting populations of bats.
- 4.1.5 The evaluation of Habitat Areas in Section SL1 is shown in Table 18.

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Table 18 – Evaluation of Habitat Areas in Section SL1

Habitat Area	Actual Activity ⁷	Potential activity ⁷	Evaluation	Comments
S1	Not surveyed	F,C.	County	Area is connected / forms part of potential commuting routes and provides foraging habitat.
S2	2R,C	R	Regional	This area has two identified roosts. Outstanding survey effort includes buildings which have the potential to be roosts. Potential and actual commuting habitat was identified.
S3	Not surveyed	F, C	County	Foraging habitat that is likely to support a population of internationally important species that is not threatened or rare in the region or county, but is not integral to maintaining those populations.
S4	Not surveyed	F	County	Foraging habitat that is likely to support a population of internationally important species that is not threatened or rare in the region or county, but is not integral to maintaining those populations.
S5	C,F	R	County	Area includes commuting routes and foraging areas. Although the outstanding survey effort includes buildings, the Habitat Area has been assessed as being of county importance. Should any roost(s) be confirmed, this evaluation will change to regional.
S6	F, C	R	County	Area includes commuting routes and foraging areas such as ponds / marsh / wet grassland as well as potential roosts. Although the outstanding survey effort includes buildings, the area has been assessed as being of county importance. Should any roost/s be confirmed this evaluation will change to regional.
S7	n/a	C,R.	County	Woodland borders provide potential commuting habitat of medium value and potential foraging habitat. This area is likely to support a population of internationally important species that is not threatened or rare in the region or county, but is not integral to maintaining those populations.
S8	C, F	R.	County	Commuting routes enrich the local habitat resource by providing linear habitat connecting foraging areas with potential roost locations. Localised areas of foraging also enrich the habitat resource within the local context.
S9	C, F	R	County	As indicated previously this area requires further survey for building and tree roost potential. Although the outstanding survey effort includes buildings as well as woodland, the area has been assessed as being of county importance. Should any roost/s be confirmed this evaluation will change to regional.
S10	Not surveyed	C,F.	County	Commuting and foraging habitat that is likely to support a population of internationally important species that is not threatened or rare in the region or county, but is not integral to maintaining those populations. Commuting routes appreciably enrich the local habitat resource by providing linear habitat connecting foraging areas with potential roosts both within and outwith the study area.

Section SL2

4.1.6 All six of the Habitat Areas identified within Section SL2 have been identified as being of county importance to bats due to the presence of potential building and tree roosts and / or due to the valuable commuting and foraging features identified. Sections SL2 and SL1 provide a similar resource in terms of the quantity and quality of suitable foraging and roosting habitat, as areas of shelter and high value foraging habitat are scarce and fragmented. However, the presence of bats

⁷ R=Roost, C= Commuting, F=Foraging

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foraging and commuting around the patches confirm the value of Section SL2 in supporting populations of bats, and in providing stepping stones between alternative areas of resource outwith the study area, including Clochandighter Wood, Shanna Burn Wood and Kingcausie.

4.1.7 The evaluation of Habitat Areas in Section SL2 is shown in Table 19.

Table 19 – Evaluation of Habitat Areas in Section SL2

Habitat Area	Actual Activity ⁸	Potential activity ⁸	Evaluation	Comments
S11	F,C.	n/a	County	Area includes commuting and foraging habitat of high value to bats.
S12	F,C.	n/a	County	Area includes valuable commuting and foraging habitat, including birch and broadleaved woodland and pools, burns and channels.
S13	F,C.	R	County	Area includes valuable commuting routes and foraging areas such as woodland, ditches, and marshy grassland. Although the outstanding survey effort includes buildings, the area has been assessed as being of county importance. Should any roost(s) be confirmed, this evaluation will change to regional.
S14	F	C.	County	Area includes commuting and foraging habitat of value that is likely to support a population of internationally important species that is not threatened or rare in the region or county, but is not integral to maintaining those populations.
S15	F,C.	R	County	Area includes commuting routes and foraging areas such as woodland, waterbodies, scrub, heath and bog. Although the outstanding survey effort includes buildings, the area has been assessed as being of county importance. Should any roost(s) be confirmed, this evaluation will change to regional.
S16	F,C.	R	County	Area includes commuting routes and foraging areas such as hedges, walls, tracks, shelterbelts, waterbodies, scrub, marshy grassland and waterbodies. Although the outstanding survey effort includes buildings, the area has been assessed as being of county importance. Should any roost(s) be confirmed, this evaluation will change to regional.

Section SL3

4.1.8 Two of the 15 Habitat Areas in Section SL3 have been identified as being of national importance primarily due to the numbers of bats supported or the range of species present; there has been a sighting of Leisler's bats within Kingcausie and a historic Leisler's bat record over the River Dee. Five Habitat Areas have been evaluated as being of regional importance to bats due to the presence of roosts and seven have been evaluated as being of county value to bats.

4.1.9 The results of habitat assessment and activity surveys within Kingcausie and surrounds show this area to be very important in terms of provision of high quality roosting, foraging and commuting habitat which is subject to very low levels of disturbance. Kingcausie includes some of the best examples of ideal bat habitat in the study area including a number of building roosts and mature broadleaved trees with suitable crevices and cracks, and a well-house with potential as a hibernaculum. The mosaic of pasture and arable land with mature broadleaved shelterbelts and woodland areas, and sheltered woodlands adjacent to Crynoch Burn and the River Dee, support a variety of species including common and soprano pipistrelles, Daubenton's, Natterer's, brown long-eared and there has been a sighting of Leisler's bats, the largest range of species in the study area. The River Dee represents a high value commuting and foraging resource connecting habitats up- and down-stream for species including the LBAP species Daubenton's bats, and supports

⁸ R=Roost, C= Commuting, F=Foraging

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maternity roosts for Daubenton's bats of national significance (Rydell, undated). This section supports and maintains populations of at least five species of bats including Daubenton's, soprano and common pipistrelle, brown long-eared and Natterer's bats.

4.1.10 The evaluation of Habitat Areas in Section SL3 is shown in Table 20.

Table 20 – Evaluation of Habitat Areas in Section SL3

Habitat Area	Actual Activity ⁹	Potential Activity ⁹	Evaluation	Comments
S17	1R,F,C	R	Regional	This area includes one confirmed roost at Red Tile Lodge which maintains population of bats not considered rare in the region. Potential and actual foraging and commuting habitat was identified.
S18	F,C.	n/a	County	Part of the area within the corridor forms part of high value habitat and includes commuting and foraging habitat.
S19	n/a	F,C.	County	Area forms part of high value habitat and includes commuting and foraging habitat.
S20	R, F,C	R	Regional	This area forms part of a wider area of high value (several roosts to the immediate north) to bats and forms a vital link between Habitat Areas, as well as providing high value foraging and roosting habitat. In addition, the presence of a tree identified as a roost, and the presence of many trees assessed as having high roost potential means that this area has been assessed as being of regional value as it maintains a population of bats not threatened or rare in the region.
S21	Not surveyed at night	R, F, C	Less than local	Although the presence of the arable fields of this area within the study area have limited value for bats in terms of foraging, commuting and roosting, they do serve a function in minimising disturbance to the areas of high value to the east.
S22	2R,F,C.	R,F,C.	Regional	This area forms part of a wider area of high value to bats including Kingcausie and Crynoch Burn and forms a vital link between Habitat Areas, as well as providing high value foraging and roosting habitat. The area includes two roosts at Storybook Glen and Eastland Bridge and several buildings with roosting potential. Crynoch Burn as a tributary to the River Dee is part of the River Dee SAC. In addition, the presence of many trees assessed as having high roost potential means that this area has been assessed as being of regional value.
S23	2R,F,C.	R,F,C.	Regional	This area forms part of a wider area of high value to bats including the rest of Kingcausie and Crynoch Burn and forms a vital link between Habitat Areas, as well as providing high value foraging and roosting habitat. The area includes two confirmed roosts, at Eastland House and Cottage. In addition, the presence of several trees assessed as having high roost potential means that this area has been assessed as being of regional value.
S24	2R,F,C.	R,F,C.	National	This area forms part of a wider area of high value to bats which includes the rest of Kingcausie and Crynoch Burn and the River Dee, and forms a vital link between Habitat Areas, as well as providing high value foraging and roosting habitat for a variety of bat species. The Habitat Area includes two confirmed roosts for species including brown long-eared bats at Rumlins Fauld and the Coach House and several buildings with roosting potential, including a well-house suitable as a hibernaculum. In addition, the presence of many trees assessed as having high roost potential means that this area has been assessed as being of regional value.

⁹ R=Roost, C= Commuting, F=Foraging

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Habitat Area	Actual Activity ⁹	Potential Activity ⁹	Evaluation	Comments
				The above features, in addition to the sighting of two Leisler's bats at the northernmost limit of their range within this area, has resulted in the evaluation of national importance.
S25	R (historic, anecdotal) F/C	F,C.	County	Area includes commuting and foraging habitat, as well as potential tree and building roosts. The historic roost at the Old Mill Inn has been removed. The location of the habitat area at the tributary of two major aquatic foraging habitat areas, and the proximity to the core area of bat activity along the River Dee, mean this habitat area is likely to support populations of pipistrelle and Daubenton's bats not threatened or rare in the region.
S26	F,C	R	County	This Habitat Area forms part of a wider area of high value to bats and edge habitat in particular forms a link between Habitat Areas, as well as providing high value foraging habitat. The area includes one potential tree roost.
S27	F,C.	R	County	Area includes commuting and foraging habitat, as well as potential tree roosts and supports populations of foraging and commuting bats which are not threatened or rare in the region.
S28	F,C.	n/a	National	The River Dee is a designated SAC and provides high value commuting and foraging habitat for bat species including common and soprano pipistrelles and Daubenton's bats (an LBAP species), all of which were present in high numbers when compared to activity recorded elsewhere in the study area. A previous record of Leisler's bats commuting along the river (Rydell et al 1993) and in recognition of these features results in an evaluation of national value.
S29	F,C.	R,F,C.	County	Area includes commuting and foraging habitat, as well as potential building roosts.
S30	2R (one confirmed and one anecdotal), F, C.	R,F,C.	Regional	This Habitat Area includes a confirmed pipistrelle roost and an anecdotal roost, as well as several potential building roosts which require further survey. One potential tree roost has also been identified. The Camphill Estate provides foraging habitat of high value and habitat edges form part of commuting routes of strategic location in proximity to the River Dee and Milltimber.
S31	F, C	n/a	County	The Deeside Old Railway Line is a linear feature with commuting and foraging habitat of value to bats, connecting areas of high value roosting and foraging habitat over several kilometres, including roosting areas at Bieldside and Milltimber, and foraging areas at the River Dee.

Section SL4

4.1.11 Five of the eight Habitat Areas identified in Section SL4 have been evaluated as being of regional importance to bats, largely due to the presence of roosts. The number of roosts represented in this section reflects the importance of built up areas such as Milltimber for bats as they provide suitable roosting opportunities, especially for pipistrelle species. Milltimber and residential areas surrounding it are likely to be of strategic importance to bats which forage over the River Dee and roosts, while commuting routes and woodland habitats in the centre and north of this section are likely to be of strategic importance to bats which commute to forage at Silverburn in Section SL5. The remaining Habitat Areas have been evaluated as being of county importance in recognition of the high quality commuting and foraging habitat they provide. The southern part of this section in particular is likely to provide vital resources for bats roosting both within and outwith the study area, especially given its proximity to the River Dee and the excellent foraging habitat south of the river.

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The section maintains and supports populations of soprano and common pipistrelles, Daubenton's and brown long-eared bats.

4.1.12 The evaluation of Habitat Areas in Section SL4 is shown in Table 21.

Table 21 – Evaluation of Habitat Areas in Section SL4

Habitat Area	Actual Activity ¹⁰	Potential activity ¹⁰	Evaluation	Comments
S32	4R,F, C.	R	Regional	The Habitat Area includes four roosts: at Culter Lodge, West Lodge, a mixed species roost for brown long-eared bats and pipistrelles at the International School and recorded roosts in Milltimber. It also includes a number of potential building roosts which require further survey effort. There are also many trees with high roost potential and commuting and foraging habitat of high value likely to be utilised by bats roosting both within and outwith the study area. The juxtaposition of high value foraging and roosting habitat in this area and the provision of linear features suitable for commuting in proximity to the River Dee mean this area is evaluated as being of regional importance.
S33	F,R,C.	R	Regional	The area includes one recorded roost, however there are likely to be more building roosts as well as tree roosts as per S32. Foraging and commuting habitat value is high and is likely to be utilised by bats roosting both within and outwith the study area.
S34	R, F,C.	F,R,C.	Regional	The area includes one roost at Bloomfield adjacent to Guttrie Hill Wood, and a number of potential tree roosts. The area includes commuting and foraging habitat and is strategically located close to Milltimber and Peterculter which are likely to contain a number of roosts.
S35	F,C.	R	County	Habitat Area includes commuting and foraging habitat, as well as potential tree and building roosts and supports populations of pipistrelle bats not threatened or rare in the region.
S36	F, C.	R	County	The area includes potential building and tree roosts and supports commuting and foraging bats which are not threatened or rare in the region.
S37	2R, F,C.	R	Regional	Area includes two building roosts at Airy Park Cottage and Beanshill House which maintain populations of bats. Also contains a number of potential tree and building roosts and commuting and foraging habitat located close to Milltimber, which is likely to support a number of bat roosts.
S38	1R,F,C.	R	Regional	The area includes one roost at Upper Beanshill as identified on day survey, as well as commuting and foraging habitat of strategic importance to bats stepping between roosting areas in Milltimber and foraging areas at Silverburn.
S39	F,C.	n/a	County	Area includes commuting and foraging habitat and supports pipistrelles, which are not threatened or rare in the region.

Section SL5

4.1.13 Three of the six Habitat Areas within Section SL5 have been identified as being of regional importance to bats on account of the presence of four roosts. The remaining three Habitat Areas have been evaluated as being of county importance as they include potential roosts and/or support commuting and foraging bats. This section includes an important green corridor that covers a wide area from Murtle Den north to Kingshill and Gairnhill Woods and provides connectivity between

¹⁰ R=Roosts, C=Commuting, F=Foraging

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valuable bat habitats including Silver Burn, Rotten O’Gairn and the Moss of Auchlea. The section maintains and supports populations of soprano and common pipistrelles and brown long-eared bats.

4.1.14 The evaluation of Habitat Areas in Section SL5 is shown in Table 22.

Table 22 – Evaluation of Habitat Areas in Section SL5

Habitat Area	Actual Activity ¹¹	Potential activity ¹¹	Evaluation	Comments
S40	1R, F, C.	R	Regional	The area includes a pipistrelle roost at Silverburn House, maintaining a population of bats which are not threatened or rare in the region. The roost is likely to be of strategic importance to bats which forage and commute through the Habitat Area.
S41	F, C.	R	County	Area includes commuting and foraging habitat, as well as potential tree roosts, and supports populations of pipistrelle bats – including those which roost at Silverburn (S40) – which are not threatened or rare in the region.
S42	R, F, C.	R, F, C.	Regional	Area includes one anecdotal roost at Ard Na Moine which is likely to be of strategic importance, maintaining populations of bats which forage and commute through the area including Gairnhill and Kingshill Woods and Silverburn
S43	F, C.	R	County	Kingshill and Gairnhill Woods support populations of commuting and foraging pipistrelle and brown long-eared bats which are not threatened or rare in the region. The area forms part of a larger habitat area that includes Murtle Den to the east and the Moss of Auchlea.
S44	2R (1 anecdotal), F, C.	R, F, C.	Regional	The area includes two roosts at Moss of Auchlea and an anecdotal roost at Backhill of Brodiach. These roosts are likely to maintain bats that forage round the Moss of Auchlea and Kingshill Wood, which form part of a larger corridor of foraging habitat that extends to Murtle Den south of the Habitat Area.
S45	F,C.	n/a	County	The Moss of Auchlea provides excellent foraging habitat in undisturbed setting and supports a population of pipistrelle bats that roost at adjacent Moss Side of Auchlea.

Section SL6

4.1.15 Of the 12 Habitat Areas identified within Section SL6, four are considered to be of regional importance to bats as they maintain populations of roosting bats. In particular, N4 has seven roosts including Fairley Home Farm and a number of trees, which is considered a significant number of roosts for the region, supporting pipistrelle, brown long-eared and *Myotis* sp.

4.1.16 West Hatton Woods, Kingswells, agricultural fields north of Cloghill and the woodland west of Hillhead of Derbeth Farm and the scrub on the slopes of Brimmond Hill are all evaluated as being of county importance, due to their importance to foraging and commuting bats, as observed during bat activity surveys.

4.1.17 One Habitat Area (Cloghill) is evaluated as being of local importance as the habitats it provides, including sheltered field boundaries with potential for commuting and foraging bats, are considered to appreciably enrich the habitat resource on the local level, although no bats were observed during evening surveys.

¹¹ R=Roosts, F=Foraging, C=Commuting

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- 4.1.18 Two Habitat Areas near the proposed North Kingswells Junction are assessed as being of less than local importance to bats due to the absence of resources suitable for supporting roosting, foraging or commuting bats and the exposed nature of the habitats found here.
- 4.1.19 Section SL6 is important to bats due to the presence of a number of roosts and its strategic location as a foraging and commuting resource connecting a large area of potential roosting habitat in Kingswells with foraging resources in the west including woodlands at Brimmond. The section maintains populations of at least four species of bats which are internationally important, but which are not threatened or rare in the region.
- 4.1.20 The evaluation of Habitat Areas in Section SL6 is shown in Table 23.

Table 23 – Evaluation of Habitat Areas in Section SL6

Habitat Area	Actual Activity ¹²	Potential Activity ¹²	Evaluation	Comments
S46	R, F, C	R	Regional	The roost at the Coach House maintains a population of an internationally important species of bat that is not threatened or rare in the region.
S47	F	R	County	West Hatton Woods support populations of internationally important species (pipistrelle bats and brown long-eared bats) which are not threatened or rare in the region or county, and are not integral to maintaining these populations. The woods are strategically located close to a known bat roost at Home Farm identified during 2004 surveys and from Aberdeen Bat Group (personal communication, Isobel Davidson). The woodlands are designated as DWS, reflecting the quality of the habitat they provide.
S48	None recorded	F, C	Local	Shelterbelts and tree lines considered to appreciably enhance the commuting route resource within the local context, especially given the proximity to Kingswells and strategic location in relation to potential foraging habitat west of the study area including woodlands at Brimmond.
N1	C	F, C.	County	Commuting route supports a population of internationally important species that is not threatened or rare in the region or county, and is not integral to maintaining those populations. Commuting routes appreciably enrich the county habitat resource by providing linear habitat connecting roosts with foraging habitat to the west of Kingswells.
N2	F, C	R	County	Brodiach Burn and pond support a population of internationally important species (Daubenton's and soprano pipistrelle bats) and the track is a commuting and foraging route for species including common pipistrelles. These species are not threatened or rare in the region or county, and the area is not integral to maintaining these populations.
N3	R	R	Regional	The anecdotal roost at Derbeth Farm is likely to maintain a population of internationally important species that is not threatened or rare in the region or county.
N4	7 R, F, C	R, F, C.	Regional	Six tree roosts and a roost at Fairley Home Farm maintain populations of internationally important species (<i>Myotis</i> sp., brown long-eared and probable common pipistrelle) that are not threatened or rare in the region

¹² R=Roosts, F=Foraging, C=Commuting

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Habitat Area	Actual Activity ¹²	Potential Activity ¹²	Evaluation	Comments
N6	F	R, C	County	Site supports a population of internationally important species (common pipistrelle bats) that is not threatened or rare in the region or county, and is not integral to maintaining those populations.
N7	1R, C, F	n/a	Regional	Tree roost maintains a small population of internationally important species (common pipistrelle) that are not threatened or rare in the region or county.
N8	F	n/a	County	Site supports a population of internationally important species (common pipistrelle bats) that is not threatened or rare in the region or county, and is not integral to maintaining those populations.
N9	None recorded	F	Less than local	Site retains habitats of limited ecological importance due to high levels of exposure.
N10	None recorded	C	Less than local	Site retains habitats of limited ecological importance due to high levels of exposure.

Evaluation Summary

- 4.1.21 Overall, three Habitat Areas were considered to be of less than local, one of local, 33 of county, 18 of regional and two of national importance by virtue of their important foraging habitats and commuting routes connecting Habitat Areas across the region. Two of the Habitat Areas support nationally important numbers/ populations of bats. These are the River Dee, which as a whole supports significant numbers of the UK's Daubenton's Bat population (including recorded roosts) and Kingcausie, which potentially supports a small but nationally significant population of Leisler's bats at the northernmost limit of their range. All of the Habitat Areas considered to be of regional value contain bat roosts and an abundance of potential tree and building roosts, which maintain populations of internationally important species. The dominance of county important Habitat Areas reflects the fact that most resources within the study area with the potential to support foraging or commuting bats were observed being used by bats during evening surveys. Due to the presence of only small numbers of bats in most areas, these were not considered to be of higher value. Where bats were not observed using Habitat Areas, but where the resources provide habitat of potential value to bats, for example due to their size or in terms of the foraging resource or shelter they provide, the Habitat Areas are considered to be of local ecological value importance. The two areas of less than local importance to bats were considered to lack any significant resources suitable for roosting, foraging or commuting.
- 4.1.22 Of the six geographical sections within the study area of the proposed scheme, SL3 (Cleanhill Junction to the A93) is considered to be the most important in terms of the size, quality and nature of habitats it provides, including the greatest range of species within a single area, and the largest numbers of bats observed over a single area (the River Dee). The number of roosts, potential roosts and the overall suitability of the section to support large numbers of bats including hibernating bats was also taken into consideration. Sections SL2 and SL4 are also considered to be of value by providing linking habitats which extend the resource provided by Section SL3 and support the populations of bats found within SL3 and high numbers of bats which could easily be utilising this central area of high value foraging and commuting habitat.
- 4.1.23 Section SL4 from the A93 to Beanshill has a high number of identified and potential roosts due to the inclusion of Milltimber, surrounding gardens and woodland as well as high numbers of bats observed. Despite the residential nature of this area, the number of mature trees in large gardens and woodland, including Milltimber Wood, provides an ideal green corridor. Section SL2 contains valuable commuting and foraging features, one identified roost and numerous potential roosts and therefore supports and maintains bat populations that are not threatened or rare in the region. Both of these sections are considered to be of regional value.

- 4.1.24 Section SL6 is considered to be of strategic importance to bats given its location close to an area of roosting habitat in Kingswells. Four species of bats were observed foraging and commuting in the small but high value habitats this section provides.

5 Potential Impacts

5.1 Introduction

- 5.1.1 The following assessment addresses the potential impacts (in the absence of appropriate mitigation) on bats, their roosts, feeding habitat, reproduction and behaviour associated with both the construction and operational phases of the proposed scheme (both short and long-term).
- 5.1.2 There are a number of different types of impacts associated with road schemes and DMRB outlines the main potential impacts likely to result from roads and bridges (DMRB, 2001). These guidelines outline the possible effects road development may have on bats and bat populations, including the following:
- direct habitat loss through land-take including loss of roost and foraging areas;
 - severance of habitat features including habitat fragmentation, isolation and severance of connectivity between habitat fragments;
 - road traffic related mortality (RTA);
 - disruption to local hydrology and associated degradation of wetland foraging areas;
 - polluted runoff;
 - effects of road lighting; and
 - habitat creation.
- 5.1.3 Potential impacts that would occur as a result of the proposed scheme vary in their effects on bat populations, depending on the size of the population and the scale, extent and persistent nature of the impact. In general, impacts that affect the number, distribution and suitability of roost opportunities and those that influence the availability of insect prey can be expected to have impacts on the behaviour and viability of bat populations within the route corridor. The size of the roost or population to be affected will also affect the significance of the impact. The main impacts are those which would involve the destruction of roosts and direct bat mortality. This is exacerbated by the relatively low availability of alternative roost sites around the landscape and the disproportionately large impact on bat populations a small number of displacements or deaths may have on bat communities in the area.
- 5.1.4 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. In addition, it is important to recognise that the potential generic impacts outlined below 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 adverse impacts of the proposed scheme (Luell et al 2003).
- 5.1.5 The specific impacts of road construction and operation vary in their significance in relation to the area of the habitat or feature impacted. While the loss and severance of woodland corners, edges and tree lines may represent only a small area of habitat, the implications for bats using these areas could be disproportionately large.

5.2 General

- 5.2.1 The potential impacts that would be likely to result from the proposed scheme have been identified and are described below for construction or operation. Where cumulative effects require consideration, this has been assessed separately (see Part E: Cumulative Assessment, of the ES).

Direct Mortality

- 5.2.2 Bats are relatively long-lived, take several years to reach reproductive maturity and then produce only one offspring a year. They therefore invest a lot of energy into producing relatively few young compared with other similar-sized terrestrial mammals, making bat populations particularly susceptible to impacts that compromise their numbers or ability to reproduce (Kunz, 1982).

Construction

- 5.2.3 There is a high risk of mortality if bats are roosting in any structure or tree to be demolished or felled. As discussed above, this may have impacts on bat populations and confers an additional risk of prosecution if bats are killed or roosts destroyed, as bats and their resting places are protected by law (see Section 1.2).

Operation

- 5.2.4 There is a risk of road traffic accidents (RTA) caused by collision with oncoming vehicles. The predicted risk is generally low as bats are unlikely to be attracted to major roads (DMRB, 2001). However, the risk is increased where the road severs flight lines and where young bats are emerging from maternity colonies as these are particularly weak fliers. It has been estimated that between one and 5% of bats die as a result of traffic accidents (Limpens et al 2005). The problem is exacerbated by the fact that most of the bat species present in Aberdeenshire fly relatively low above the ground when commuting (Bach and Limpens, 2004).
- 5.2.5 Highway projects can cause bat traffic casualties for a number of reasons including severance of a bat commuting route either directly or indirectly (e.g. road lighting). Placement of a new road close to a roost(s) may encourage bats to use new features parallel with the route as new flightlines. Air turbulence caused by fast and large road traffic is thought to suck nearby bats into the path of oncoming vehicles. Lighting can encourage some species (e.g. noctules, pipistrelles and Leisler's bats) to forage close to highways as prey is attracted to roadside lighting. It is thought that juveniles may be at greater risk due to their inexperience (Highways Agency, 2005).

Habitat Loss

- 5.2.6 Bats are particularly sensitive to habitat loss, and even small patches of habitat may have wide-ranging implications for the bats that use them (DMRB, 2001). High roost fidelity and roost selectivity in certain species (e.g. brown long-eared bats; Entwistle et al., 1997) mean that loss of roost sites may be detrimental to the populations using them. In particular, this may be manifested by the selection of sub-optimal roost sites which may influence survival rates, especially at sensitive times of year including during hibernation or breeding. Optimal habitats including broadleaved woodland, habitat corridors and lacustrine/riverine habitats are relatively rare and their distribution scattered (Walsh et al., 1996a and b) and bat populations are likely to be susceptible to changes in resource availability. Although the habitat lost may recover in the medium to long term, following the construction period the quality of the habitat may be reduced, especially if the connectivity between remaining patches is also compromised.
- 5.2.7 Bats use linear features such as rivers, hedgerows and treelines as commuting routes between roosts and foraging grounds (Limpens and Kapetyn, 1991). The integrity of these habitat features is often critical to the continued viability of bat populations as bats need to be able to move freely between them (Mitchell-Jones and McLeish, 1999). Therefore, small scale modifications to such

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features, for example as a result of development, must be taken into consideration when predicting the impacts of a development (Warren et al., 2000) as per impacts of direct mortality and fragmentation.

Construction

- 5.2.8 In the short to medium term habitat loss would be manifested through land-take for the siting of compounds, access roads and other construction activities, although the loss of roosts is also considered to be a construction impact as it has an immediate and permanent impact on roosting. The locations of construction compounds are not known, but the impact assessment identifies potential habitat loss impacts that could be expected due to general construction activities.

Operation

- 5.2.9 Permanent habitat loss would be caused by the permanent road structure and associated embankments, cuttings and slip roads. The loss of high value foraging and commuting habitat has the potential to affect the viability of an area to support bats in the long term.
- 5.2.10 The proximity of a roost to the operating road may affect the long-term suitability of the roost for use by bats as even subtle alterations in air flow, the accessibility of roost entrances and the availability of nearby shelter can affect bats' use of a roost or the likelihood of the roost being used.
- 5.2.11 Habitat enhancement may be an indirect result of construction for example the provision of attenuation ponds for the settling of road runoff may enhance the value of areas for bats by creating new drinking and foraging opportunities on maturation where they previously did not exist.
- 5.2.12 Aside from direct loss of roost access, the scheme would damage foraging habitat either by direct land-take and fragmentation, or by indirectly severing commuting routes from roosts, polluting watercourses and waterbodies or through the effects of light spillage (Highways Agency, 2005).
- 5.2.13 In addition, the modification of commuting routes by habitat loss may cause bats to fly into the path of oncoming traffic, leading to direct mortality due to RTAs and habitat fragmentation.

Habitat Fragmentation and Isolation

- 5.2.14 Many of the impacts of habitat fragmentation and isolation are common to the construction and operation phases, and also to the impacts of habitat loss and direct mortality. Impacts include the loss of hedges, fences and tree lines used for navigation by bats, which may be a particularly adverse impact on low flying bats including pipistrelle and *Myotis* species, and brown long-eared bats (Limpens and Kapetyn, 1991), causing the isolation of resources and increasing the effort needed to commute between them. This may be exacerbated by the patchiness of roosts and foraging areas used by bats. Severance of commuting corridors and removal of sheltered flyways between patches may affect access to resources and could affect long term survival of populations of bats, particularly where this occurs within 100m of a maternity roost as pregnant females may need to feed closer to the roost (Racey and Speakman, 1987). The effects of direct habitat fragmentation and isolation are coupled with the risk of RTA due to vehicle collision as per direct mortality above.

Construction

- 5.2.15 Construction impacts of habitat fragmentation and isolation are limited to those short-term impacts caused by the positioning of site compounds, access roads and other construction activities. The locations of construction activities for the proposed scheme are not known, but the impact assessment identifies potential habitat fragmentation and isolation impacts that could be expected due to such activities.

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Operation

- 5.2.16 Where the road or junctions would pass directly through habitat used by bats, areas of habitat used for roosting, foraging or commuting could be fragmented and isolated. In addition, severance of flight routes used for commuting between areas of habitat, including indirect isolation of Habitat Areas where flight lines would not be directly severed but the road passes between Habitat Areas, could be caused by the operating road. Although mitigation measures may restore some connectivity, it is likely that some degree of connectivity would be lost in the long term with implications for bats' navigation around the landscape and access to resources.
- 5.2.17 Long term impacts of the proposed scheme would include the presence of lanes of moving traffic which would act as a barrier to movement between habitats within the landscape. This is exacerbated by the constraints of echolocation calls in some bat species, including brown long-eared bats (Entwistle et al., 1996). Bats may be deterred from crossing the road if their echolocation calls are unable to penetrate to the other side. While this has beneficial impacts in terms of reducing the operational impacts of road mortality, it reduces resource accessibility including roost or foraging habitats, forcing bats to use sub-optimal resources. Similarly the new road may render roosts unviable if it were to pass between the roost and optimal foraging habitat (Rob Raynor, SNH, pers. comm.).

Disturbance

- 5.2.18 The effects of disturbance would likely be most noticeable during construction, in particular during felling and demolition works as bats would modify their behaviour to accommodate disturbance over time.

Construction

- 5.2.19 Increased human presence and the use of heavy machinery would be likely to cause extra dust, noise and vibration which could cause disturbance to roosting bats and may even cause bats to abandon a roost, especially if works take place at night and if blasting is used in the construction of cuttings.
- 5.2.20 Night-time working involving floodlighting may cause disruption of foraging and commuting behaviour (Rydell and Racey 1993). In particular, the use of lighting close to a roost may influence emergence behaviour and activity. Bright light could cause bats to move away from an area or to desert a roost.
- 5.2.21 Changes in site layout due to habitat modification during construction would be likely to bring about changes in local environmental conditions including temperature and humidity regimes. As well as affecting roost suitability such modification may affect emergence and behaviour of bats using the area by altering commuting routes.

Operation

- 5.2.22 While fast-flying bat species including Leisler's bats, and also pipistrelle bats, could be attracted to the insects which feed over street lamps, slower flying species including brown long-eared, Natterer's and Daubenton's bats would be likely to avoid areas once street lights have been installed (Rydell and Racey, 1993). It is not known how much lighting provision there is likely to be along the proposed scheme, although the provision of lighting at junctions and along the carriageway would be likely to have wide-ranging implications on the distribution and foraging behaviour of bats, especially if used along river corridors, and near woodland edges.
- 5.2.23 Maintenance operations can potentially affect bat roosts in bridges or trees and can cause disturbance to bats in roosts (DMRB, 2001). Bats' colonial habits and dependence on buildings and

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similar structures for roosting also make them vulnerable to repair work, re-roofing and the use of toxic timber treatment chemicals etc. (Schofield and Mitchell-Jones, 2003).

Pollution

Construction

- 5.2.24 During construction, fluctuation in water regimes in burns, lochs and wetland areas could occur as a result of channel siltation through embankment construction, cutting excavation, culvert installation and provision of temporary access roads and vehicle washing. These would be likely to bring about modifications to the channel bed morphology and water turbidity as discussed in Chapter 24 (Water Environment) and Appendix A25.9 (Freshwater Ecology). Such fluctuations would be likely to result in modification of the insect prey availability with subsequent consequences for foraging bats. Pollution and impacts affecting aquatic habitats are dealt with fully in the Otter and Freshwater Ecology reports (Appendices A25.5 and A25.9) and are therefore not covered in detail in this report.
- 5.2.25 The introduction of dust and particulate matter (PM₁₀) into the atmosphere during construction has the potential to affect the availability and abundance of bats' insect prey as well as causing other health risks to the bats using the area.

Operation

- 5.2.26 Long term alterations in the sediment load and channel morphology of water features due to road surface runoff, and alteration of water quality due to runoff and spills during road construction and operation may affect the availability of insects. Insects are sensitive to changes in water quality over time and so the proposed scheme could change the suitability of water and wetland features for foraging especially by Daubenton's and Pipistrelle bats which rely on the insect prey that such habitats provide (Rydell et al 1994). In addition, spills of a toxic nature may pollute drinking water directly and oil on the surface of water would reduce its suitability for drinking. The potential impacts due to pollution have been covered in the otter and river habitat reports.
- 5.2.27 Maintenance of the highway, such as resurfacing, may involve temporary disturbance if night-time working were used, or if verge habitats and associated foraging areas were altered. The effects of pollution are covered in the preceding section.

Beneficial Impacts

- 5.2.28 Few beneficial impacts would be likely to arise as a result of the proposed scheme in the absence of sensitively designed mitigation measures, and many of the potential beneficial impacts would be balanced by adverse impacts as a result of the construction and operation of the road.
- 5.2.29 The creation of a linear feature through the landscape may potentially provide linear habitat suitable for connecting alternative foraging and roosting areas – though only if sensitive mitigation planting alongside the road is also included in the design of the proposed scheme. However bats are unlikely to use a road and roadside habitats in preference to existing linear features including drystone dykes, tree lines and waterways, and care must be taken in order to avoid increasing the risk of traffic casualties by attracting bats to the road, as indicated earlier.
- 5.2.30 Road lighting has the potential to attract insects and is considered a reliable food source, and while *Plecotus* and *Myotis* species tend to avoid lights to escape predation from birds, pipistrelle bats will swarm around lamps and feed on insects (Rydell and Racey, 1993). However it has been observed that such behaviour is associated with an increased risk of road traffic casualties as well as an increased risk of predation (Highway Agency, 2005).
- 5.2.31 The proposed scheme would result in reduced traffic flows on existing roads which currently lack mitigation measures. Although no bat RTAs have been recorded in the study area, it is likely that a

number of incidents go unrecorded. The reduction in traffic speeds along unmitigated roads may thereby help to reduce direct road mortality on these roads. However, this beneficial impact is unlikely to outweigh direct mortality arising from other impacts as a result of the proposed scheme.

- 5.2.32 The impacts referred to in this report refer only to the potential to affect bats and their behaviour and viability. The assessment of impacts on the inherent ecological value of the habitats is provided in Appendix A25.1 (Terrestrial Habitats) and Appendix A25.9 (Freshwater Ecology).

5.3 Specific Impacts

Section SL1

- 5.3.1 In Section SL1, direct mortality as a result of the construction of the proposed scheme is not expected as no roosts or potential roosts would be destroyed. Due to the daytime nature of works, the generally low levels of disturbance would be unlikely to affect commuting and foraging bats as a result of the construction of the road. However, a roost at Lochview Croft near Charleston Junction would be likely to experience increased disturbance due to noise and the impact magnitude is assessed as being medium negative magnitude and Moderate significance. All other construction impacts described above are as assessed as being of low negative magnitude and Minor significance.

- 5.3.2 During the operation of the road, there is the potential risk of direct mortality along the edges of Duff's Hill plantation where commuting bats were observed. The potential impacts have been assessed as major negative magnitude and Moderate significance. Habitat loss, fragmentation and severance of a commuting/foraging route extending north/south across the corridor along the road adjacent to Hare Moss cottages would also occur with impacts assessed as medium negative magnitude and Moderate significance. Some foraging habitat loss would be likely to occur along the southern edge of Hare Moss, both directly and as a result of potential changes to the local water regime during the construction and operation of the scheme. The suitability of Lochview Cottage as a roost and the likelihood of cottages to the east of Hare Moss being used as roosts may be reduced. These impacts have been assessed as major negative magnitude and Moderate significance. Other impacts, such as the loss of foraging habitat and disturbance due to light pollution at Hare Moss has been assessed as being of low negative magnitude and Minor significance.

Section SL2

- 5.3.3 Impacts from the proposed demolition of a potential roost at Greenloanings Cottage have been assessed as high negative magnitude and Moderate significance. There is potential for disturbance to foraging and commuting bats if night works were required near Bishopston or Heatherknowe, which has been assessed as low negative magnitude and Minor significance.
- 5.3.4 The operational scheme would sever commuting routes such as the access track to Heatherknowe, the road between Clochandigher and Auchlunies, the access track south of Whitestone and the road to the south of Cleanhill Wood. The potential impacts from severance has been assessed as medium negative magnitude and Moderate significance. In addition, severance of these routes would increase the risk of direct mortality through potential RTAs which has been assessed as high negative impact magnitude and Moderate significance. Permanent habitat loss would occur through the loss of potential roosts at Greenloaning Cottage and the loss of small areas of high value linear foraging and commuting habitat alongside roads and field boundaries at Bishopston and south of Whitestone. Potential impacts from habitat loss have been assessed as medium negative magnitude and Moderate significance. Fragmentation of already small and patchily distributed areas of bat habitat would also be likely to occur, however these impacts have been assessed as low negative magnitude and Minor significance.

Section SL3

- 5.3.5 In Section SL3, there is potential risk of direct mortality during construction of the road, but no roosts have been identified for demolition. As the proposed surveys in this area are being completed at the time of writing this report, it is possible that unrecorded tree roosts exist on the alignment of the proposed scheme, particularly within the mature trees at Kingcausie. However, given the importance of the area to bats, potential impacts on this area has been assessed as high negative magnitude and Major significance. There is also potential for disturbance during construction from increased human presence, felling of trees, junction and bridge construction. The impacts from these activities would particularly be of concern where potential roosts are located nearby, as their suitability as roosts may subsequently reduce. The potential impacts from disturbance have been assessed as low negative magnitude and Minor significance.
- 5.3.6 There is risk of direct mortality during the operation of the road as a result of RTAs within Cleanhill Wood where the proposed scheme would sever at least five commuting routes at woodland edges and along the South Deeside Road. These impacts have been assessed as high negative of Major and Moderate significance, respectively. Additional RTA risk is not anticipated where the road crosses the River Dee, as bats would fly under the proposed bridge. Potential pollution of the River Dee during construction and operation would have an adverse impact upon prey species available which has been assessed as medium negative magnitude and Major significance). Impacts from the severance of the foraging and probable commuting route along the Deeside Old Railway Line have been assessed as medium negative magnitude and Moderate significance. Should the status of Leisler's bats within the AWPR study area be confirmed as a viable population, these impacts could be further exacerbated if there was potential to affect the viability of the Leisler's bat population in the area.
- 5.3.7 Permanent habitat loss and fragmentation would be likely to be a significant impact in this section due to the felling of trees with high potential for roosting bats. High value roosting, foraging and commuting habitat would be severed within Cleanhill Wood and Kingcausie, by the road and as a result of the proposed realignment and regrading of Kingcausie Burn. High value riparian and aquatic habitat used by large numbers of bats would be lost during construction. The use of lighting at the proposed Cleanhill Junction may also cause long term disturbance of bat foraging and commuting areas. These potential impacts have been assessed as high negative magnitude and Major significance for Habitat Areas S20 and S24 and of Moderate significance for Habitat Area S19.

Section SL4

- 5.3.8 In Section SL4, there would be a risk of direct mortality to bats during construction as the scheme would require the demolition of a mixed common pipistrelle and brown long-eared bat roost at the International School in Milltimber. These impacts have been assessed as high negative magnitude and Major significance. The severity of the impact is considered higher because at least two species would be affected. One building with roost potential, but where no bats were observed to emerge, would also be destroyed. The proximity of the road to potential roosts in Milltimber may reduce the suitability of this area for bats. As affected habitat areas are of County/Regional value for bats (S29, S32 and S33), these impacts have been assessed as being of medium negative magnitude and Moderate significance.
- 5.3.9 During operation of the scheme, there is a risk of direct mortality as a result of RTAs where the road would cross known commuting routes along the North Deeside Road, the access track to Culter House Wood, Culter House Road, Contlaw Road and the access track to Beans Hill (Habitat Areas S29, S32 and S33). These impacts have been assessed as high negative magnitude and Moderate to Major significance for County and Regional Value Habitat Areas, respectively. Habitat loss would result from the demolition of a number of other buildings and trees that have been identified as having roost potential in an area used extensively by bats for roosting, commuting and foraging. Loss of foraging habitat at Beans Hill would also have an adverse impact upon local bat populations. Habitat fragmentation would occur from the loss of habitat either side of the road at

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Milltimber if connectivity for bats was not provided for. These impacts have been assessed as being of medium negative magnitude and Moderate significance. The effects of lighting at the junction at North Deeside Road are anticipated to be minimal as this road has existing lighting. There is potential for disturbance to the bats roosting at Airy Park Cottage. These impacts are assessed as being of low negative magnitude and Minor significance.

Section SL5

- 5.3.10 No roosts would be destroyed in Section SL5 for construction of the proposed scheme. There is potential for disturbance to bats roosting at Ard Na Moine and Moss Side of Auchlea, where the road would pass within 200m. These impacts have been assessed as being of low negative magnitude and Minor significance.
- 5.3.11 There is a risk of direct mortality as a result of RTAs during operation of the scheme where the scheme crosses known bat commuting routes, in particular at East Silverburn and a number of potential commuting routes connecting the roost at Moss Side of Auchlea and Auchlea Moss to foraging opportunities at Kingshill Wood. These impacts are assessed as high negative magnitude and Moderate to Major significance. Minimal habitat of value to bats would be lost to the scheme at Rotten O'Gairn. Fragmentation and isolation would be a potential impact at Habitat Areas S40 to S45 where the proposed scheme would pass between roosts and areas of key foraging habitat, between Rotten O'Gairn, East Silverburn Woods and Gairnhill Wood and between Auchlea Moss and Kingshill Wood. These impacts have been assessed as medium negative magnitude and Moderate significance. Disturbance may occur as a result of traffic noise and road lighting during operation of the scheme, as the section is relatively undisturbed at present. The potential impacts from habitat loss and disturbance have been assessed as low negative magnitude and Minor significance.

Section SL6

- 5.3.12 There is potential for direct mortality and habitat loss during the construction phase as tree roosts would be felled in the tree lines north of Fairley Home Farm. There is potential for disturbance during felling of West Hatton Wood, Fairley Home Farm Wood and the tree lines near Dykeside. These impacts are assessed as being of high negative magnitude and Moderate to Major significance in terms of direct mortality and habitat loss, respectively. Potential disturbance impacts have been assessed as medium magnitude and Moderate significance.
- 5.3.13 There is a risk of direct mortality due to RTA during the operational phase of the scheme where the road would sever West Hatton Wood and commuting routes near Cloghill, Fairley Home Farm and tree lines toward Brimmond Hill. These impacts are assessed as being of high magnitude and Moderate significance for County value Habitat Areas and Major significance for Regional value Habitat Areas. Habitat loss and severance would result where the proposed scheme would pass through West Hatton Wood, Fairley Home Farm Wood and shelterbelts between Fairley Home Farm and Brimmond Hill/Dykeside. The severance of important linear connecting habitat would affect on the accessibility of foraging resources to the west of the road, fragmenting already small areas of optimal foraging and roosting habitat. The loss of this high value habitat that is likely to contain significant populations of roosting bats, especially given its strategic location close to Kingswells, may reduce the viability of the area to support foraging and roosting bats in the long term. These impacts have been assessed as high magnitude and Moderate significance for County value Habitat Areas and Major significance for Regional value Habitat Areas.
- 5.3.14 The operation of the road would have an impact on existing roosts, particularly tree roosts within 50m of the alignment near Fairley Home Farm and in the shelterbelts towards Dykeside. The loss of important connecting habitat is likely to further reduce their suitability for roosting bats. The suitability of the tree lines at Dykeside as commuting and foraging routes would be further reduced due to lighting at the proposed North Kingswells Junction. These impacts have been assessed as being of medium negative magnitude and Moderate significance.

6 Mitigation

6.1 Introduction

- 6.1.1 This section of the report outlines measures that could be used to prevent, reduce or offset adverse effects of the proposed scheme on the bat species and habitat features stated above, in accordance with the EIA regulations. Where impacts cannot be prevented or reduced to acceptable levels, compensation works will be carried out to offset the adverse effects. The level of mitigation should be proportionate to the size and scale of impact predicted and the status of the bat population to be impacted. Habitat loss should be compensated for on at least a like-for-like basis, by providing equivalent habitat in terms of area of land, numbers of trees and the species of tree or shrub to be lost (taking into consideration that some foraging habitats can take long periods of time to establish and to act as an effected replacement for that which has been lost).
- 6.1.2 The Bat Mitigation Guidelines (Mitchell-Jones, 2004), Habitat Management for Bats (Entwistle et al., 2001), the Design Manual for Roads and Bridges (HA 80/99), as well as, British Standards, National Planning Policy Guidelines (NPPG) and consultation with the Aberdeen Bat Group, SNH and professional judgement were used in determining the design of mitigation measures for bats.

6.2 Generic Mitigation

- 6.2.1 Generic mitigation measures to be adopted across the scheme are described in Table 24. A precautionary approach has been adopted, whereby mitigation has been recommended wherever adverse impacts on bats and bat populations are predicted, even in areas where no bats were recorded in surveys. This approach is necessary due to the seriousness of offences made under UK and European law in relation to bats, to ensure that the targets and objectives of the UK and local BAPs are met and to ensure there is no overall decline in bat populations.
- 6.2.2 A pre-construction Bat Mitigation Strategy will be developed to ensure that effective and appropriate mitigation can be planned and implemented before any impacts on bats are likely to occur. This will include the regular monitoring of potential roost sites, including trees and buildings, which would be likely to be affected by the proposed scheme. Such a strategy will ensure mitigation is effectively undertaken and will avoid delays in construction programming due to bat mitigation measures. For each section of the route, the Bat Mitigation Strategy will include detailed method statements to cover all mitigation measures required to prevent, reduce and offset identified impacts.
- 6.2.3 Mitigation aims in the first instance to avoid direct mortality and disturbance of bats by appropriate timing and methods of working. Where this is unavoidable, licenses will be applied for from the Scottish Executive (SEERAD) under the advice of Scottish Natural Heritage.
- 6.2.4 Habitat enhancement works, such as roost provision will be in place and effective prior to commencement of construction, so that alternative roosts can be established before old roosts are lost. In the long term habitat maintenance and management will be given priority to ensure that the population will persist. Post-development monitoring of bat populations will be undertaken to assess the success of the scheme and to inform continuing management plans.

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Table 24 – Generic Mitigation Measures

Potential Impact	Mitigation Type	Description of Mitigation
Direct mortality	Prevent	<p>Direct mortality to be prevented by detailed surveys by licensed bat workers to locate roosts in built structures and trees prior to construction including properties to be demolished. Felling and demolition will take into account findings of examination. If bats are likely to be disturbed, works will cease and advice will be sought from SNH including an application for a SEERAD licence (DMRB, 2001).</p> <p>Felling and demolition will be carried out by experienced contractors and under the supervision of licensed bat workers. Trees with roost potential will be removed by soft felling with retention of features suitable for roosts to provide natural roost opportunities in newly created/modified areas (Cowan, 2003). Limbs will be removed and lowered in sections using straps and with cracks wedged open, and left lying on the ground for 24 hours (48 in cold weather) prior to removal from site to allow any concealed bats to disperse.</p> <p>Road traffic casualties will be avoided by the provision of safe crossing points for bats. Where the road severs flight lines, and in particular where the road is on an embankment, planting will reduce the risk of collision with oncoming vehicles by forcing bats to fly over the top. Bridges and culverts have also been shown to be used as safe crossing points by bats (Bach and Limpens, 2004) where they are enhanced by guiding or sheltering vegetation or structures along the bridge.</p> <p>Crossing points include 'up and over' hedges and trees between 2-6m high, alterations to proposed underpasses (see Badger report in Appendix A25.2 and Otter report in Appendix A25.5) and sensitive design of road and right of way crossing points to enable bats to use them will be used to prevent bats flying over the road.</p>
	Reduce	<p>Demolition and felling will be undertaken outside sensitive times of year which are mid-May – October for maternity roosts; the end of October and mid-April for hibernacula; and mid-April – mid-May and October for potential roosts with unknown status.</p> <p>Monitoring of bats' use of crossings including underpasses, overbridges and culverts will be undertaken regularly during the operation of the proposed scheme to assess whether additional provision is necessary to reduce RTA. Monitoring of bat activity will be a key requisite of operational aftercare management contracts.</p>
	Offset	<p>Where current or past signs of bat roosts are discovered in trees or buildings to be unavoidably removed, replacement roosts will be provided and monitored with emergence counts prior to removal. Removal of roosts will proceed when bats are not in residence. Exclusion of the colony may be attempted by blocking access points after natural dispersion and before their return (DMRB, 2001). The site specific exclusion methods will be detailed as part of the licence agreement.</p> <p>Where alternative crossing points are provided, tree planting will be positioned to guide bats toward the crossing point. In locations not identified as crossing points, roadside planting will use trees that do not produce nectar or attract insect prey and will be at least 10m from the road to ensure bats do not try to cross (Lemaire and Arthur, 1999).</p>
Habitat loss	Prevent	<p>Habitat loss will be prevented by removal of trees and buildings only where there is no alternative, and within the minimum area necessary.</p> <p>Works compounds, storage sites and access roads will be located at least 30m from roosts and avoid areas of woodland, wetland and scrub to prevent degradation of valuable bat habitat.</p> <p>Where loss or degradation of valuable habitat is unavoidable and where watercourses are realigned, they will be returned to their former quality or improved once construction is complete.</p> <p>Works will follow BS 5837 (1991) guidance for trees in relation to construction, to avoid damage to the tree. Trees to be retained will be safeguarded from damage according to BS 5837 (1991).</p>

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Potential Impact	Mitigation Type	Description of Mitigation
	Reduce	<p>Some felled trees will be left in areas of woodland clearance to provide foraging habitat and egg laying habitat for insect prey larvae.</p> <p>Loss of aquatic habitats will be kept to a minimum, including retention of bankside vegetation, natural water features including pools and riffles, and activities such as dredging will be avoided as it destroys vegetation and associated insect abundance. This will help meet conservation targets for Daubenton's bats in line with the LBAP.</p> <p>Maintenance works on newly planted habitat will include coppicing and pollarding to provide future roost opportunities and maximise prey diversity for foraging bats (Entwistle et al., 2001).</p> <p>Freshwater habitats, including detention basins and drainage channels, and woodland edge and hedgerow habitats, especially those within 1km of roosts, will be managed to increase prey diversity to maintain value as flight lines and foraging areas.</p> <p>Maintenance of existing habitat of value to bats to be retained and creation of new habitat to occur. Landscape planting will be undertaken using locally obtained native species typical of the area. The value of existing woodland features to be increased by avoiding monoculture planting to provide diversity and thus support a variety of insects.</p>
	Offset	<p>Where older trees and those with suitable crevices are to be lost (due to construction and operation phases) bat boxes will be erected to provide alternative roost sites and offset those to be lost until replacement trees have matured. Bat boxes have been shown to be readily used by the types of species recorded along the survey corridor e.g. Daubenton's bat and pipistrelle species (DMRB, 2001). Many more replacement roosts will be needed than the number of trees and buildings to be lost in order to increase the likelihood of being discovered and used by bats and to replace roosts which may be abandoned due to proximity to the road. It is recommended that boxes be installed at a ratio of four boxes per tree with roost potential to be replaced.</p> <p>Bat boxes will be located according to the following criteria in order to increase the likelihood of bats using them:</p> <p>Boxes will be sited at least 30m away from the proposed scheme to prevent attracting bats to the road.</p> <p>A mixture of box types will be used to cater for seasonal and species requirements (Mitchell-Jones, 2004). Durable woodcrete (Schwegler) boxes require less maintenance, are longer lived than wooden boxes and offer greater protection against adverse weather conditions (Cowan, 2003). Further surveys to determine species and location may be required to enable species specific bat box mitigation.</p> <ul style="list-style-type: none"> - Boxes will be sheltered from extreme weather conditions and positioned in a range of different aspects to ensure a range of temperature conditions. - Boxes will be sited in areas where bats feed frequently and will be planned to maximise the chances of bats finding them, for example near existing flight lines. - Obstructions including overhanging vegetation will not restrict access to the roost. There will be at least a 3m clear drop under the box and 1m space in front, above and to the sides. - Boxes will be placed 4-5m above the ground to avoid disturbance including vandalism and taking into account that boxes will need to be monitored. - Provision of nursery roosts and hibernacula is particularly important as they are harder to find. <p>Loss of long term foraging and roost habitat will be offset by compensation planting of broadleaved trees (oak, ash, beech) of local provenance on a like for like basis. Where possible, more trees will be planted than are to be removed during works to increase chances of trees reaching maturity. Habitat creation recommended for other species for example birds and otters will also benefit bats. Habitat creation schemes will contribute toward</p>

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Potential Impact	Mitigation Type	Description of Mitigation
		<p>targets in Local and National BAPs for Pipistrelles and Daubenton's bats.</p> <p>A bat box monitoring and maintenance programme will be established in conjunction with the local bat group, and monitoring will continue during the aftercare and operation of the road. Bat boxes will be monitored by suitably licensed bat workers twice a year in April/May and September to avoid disturbance to bats with young and hibernating bats (Mitchell-Jones, 2004). The species and number of bats will be recorded and bat boxes not used within three years will be repositioned in alternative sites nearby.</p>
Habitat Fragmentation and Isolation	Prevent	<p>Habitat fragmentation and isolation will be avoided during construction by sensitive location of works compounds and storage sites so access to important areas of bat habitat or roosts is not compromised.</p> <p>The operational scheme will not prevent bats from moving freely within and between available Habitat Areas. This includes maintaining connectivity between foraging and roost areas and retention of known flyways.</p> <p>Culverts and tunnels have been shown to be used by bats including pipistrelles, Natterer's and Daubenton's bats, which have also been recorded flying longer distances to use tunnels rather than flying directly over a motorway, even where the tunnel is narrow or long, supporting their role in conservation of connectivity of landscapes (Bach and Limpens, 2004). Underpasses and culverts including those which have been identified in the badger report will be provided at suitable locations where flyways are known to cross the proposed scheme. These will be at least 1.5m x 1.5m in cross section (Brinkmann et al., 2003) and preferably allow water to flow through and include lead-in structures or planting in order to increase chances of being used.</p>
	Reduce	<p>New and diversionary flight lines will provide roost opportunities to provide resting points for energy expensive detours. Woodcrete bat boxes will be provided in (Schwegler IFQ 56.5 x 35 x 8.5cm dimensions) non structural elements of bridges to provide roosting habitat.</p> <p>Where possible, woodland rides will be maintained and natural regeneration encouraged in gaps to offset isolation in the long term.</p>
	Offset	<p>Habitat fragmentation will be offset by the provision of vegetation along verges and embankments to establish connectivity of landscape features for bats. Habitat creation will aim to fill in existing gaps in linear vegetation features and new areas of woodland will adjoin existing blocks or act as stepping stones between neighbouring woods or connecting tree lines (Entwistle et al., 2001)</p> <p>Where planting is recommended to provide continuity of habitat, temporary fencing will be provided to maintain flight lines until trees have matured. This will have the added advantage of providing shelter for insects enabling bats to forage en route. Barriers and environmental corridors will be designed with consideration to DMRB (DMRB, 2001).</p> <p>A crossing monitoring programme will be established to assess its success.</p>
Disturbance	Prevent	<p>Site compounds and construction activities including plant and accesses and especially activities such as blasting which have a high impact on the surrounding area will be confined to the minimum area required for the works and temporary work areas and according to construction standards. In particular they will not be sited on areas of important habitat for bats or within 30m of roosts to prevent disturbance to bats using these areas. Roosts will be identified to contractors to ensure that they are not accidentally disturbed.</p> <p>Trees to be retained will be safeguarded from damage according to BS 5837 (1991).</p> <p>Night works will be avoided during construction if bats are present, in particular during the summer months (May to September) when disturbance to bats during peak activity times and when nursing young may influence behaviour. Night working will only be undertaken with the agreement of SNH.</p> <p>Bat roosts will not be directly illuminated and lighting must be avoided altogether near woodland edges and ponds. If a building or tree containing a roost is to be illuminated, there will be a curfew point at which lights are switched off (bat emergence time and during peak activity times). Roosts will not be illuminated after 8.30 pm between May and September. The advice of bat specialists will be sought in the design of junction lighting.</p>

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Potential Impact	Mitigation Type	Description of Mitigation
	Reduce	<p>As for direct mortality, thorough inspection of buildings and trees within 30m of works will be carried out prior to works to establish roost status. Where roosts are identified in close proximity to the road, barriers will be erected to avoid disturbance by lighting, vibration, noise (including night working) and to avoid traffic accidents</p> <p>Night working (between sunset and sunrise) will be avoided near to roosts to prevent alteration of bat emergence and social behaviour.</p> <p>The level of and provision of lighting including roadside and works will be kept to a minimum according to BS 5489 and the ILE Guidance for the Reduction of Light Pollution (The Institution of Lighting Engineers, 1992). Low pressure sodium lamps will be used in preference to high pressure sodium or mercury lamps and the brightness will be kept as low as possible by directing the beam downwards using hoods and limiting the height of lighting columns.</p>
	Offset	<p>Provision of alternative roosts (see bat box criteria above) where disturbance to current roosts is likely to be unavoidable (due to the road being less than 30m away).</p> <p>Natural screens will be provided along the scheme to offset disturbance caused by noise and vibration (see also reports in Chapters 26: Landscape, and 27: Visual).</p>
Pollution	Prevent	<p>Site management practices to minimise the risks of secondary impacts to habitat adjacent to the proposed route will be adopted. Surface and foul water will be appropriately drained and stored. Chemicals, oils and fuels will be kept safely stored and away from water features and waste will be appropriately managed. Sites will be restored fully on completion of works and contractors will adhere to SEPA PPG guidelines (SEPA, February 2003) with respect to preventing pollution incidents near watercourses and water features.</p> <p>PPG 1 – General guide to prevention of water pollution</p> <p>PPG 3 – Use and design of oil separators</p> <p>PPG 5 – works in, near or liable to affect watercourses</p> <p>PPG 6 – Working at construction and demolition sites</p> <p>PPG 21 – Pollution Incident Response Planning</p> <p>Details regarding pollution control can be found in the Otter Report (Appendix A25.5) and Freshwater Ecology report (Appendix A25.9)</p> <p>Road runoff will be treated using SUDS techniques including collection in treatment facilities including petrol interceptors, silt traps and balancing ponds according to SEPA PPC guidelines (SEPA, February 2003) as per mitigation during the construction phase.</p>
	Reduce	<p>Levels of dust will be minimised so that this does not build up significantly on trees and scrub vegetation.</p>

6.3 Specific Mitigation

- 6.3.1 Mitigation for bats is aimed at maintaining populations (particularly breeding populations), minimising disturbance, maintaining access for bats to their present foraging habitats, allowing existing populations to expand and colonise new areas and minimising the risk of road traffic accidents involving bats by:
- prevention of direct mortality by the exclusion of roosts that are to be destroyed. A licence must be obtained from the Scottish Executive Environment and Rural Affairs Department (SEERAD) at least a year in advance of development commencing. It is not necessary to demonstrate that bats are using replacement roosts prior to destruction however, replacement roosts must be provided prior to works;
 - ensuring that construction activities, including the felling of trees and destruction of buildings, will be timed to avoid periods when bats are sensitive to disturbance, i.e. summer and winter. Such features will be rigorously inspected immediately prior to their removal by licensed ecologists and a precautionary approach will be adopted to prevent any bat mortalities, e.g. the sectional felling of trees in autumn;
 - the use of screens to protect bats that may be roosting in trees during construction;
 - delineating a 50m buffer around all bat roosts (that are not to be excluded and destroyed). No construction activities that constitute 'disturbance' to bats will take place within a 50m buffer zone;
 - ensuring that trees that are to be retained must be safeguarded from damage in accordance with the guidance provided in BS 5837 (1991);
 - designing, where appropriate, culverts and underpasses for bats that are at least 1.5m x 1.5m in cross section (Brinkmann et al., 2003). Previous studies have shown that, in time, appropriately sized structures will be used by bats (Bach and Limpens, 2004). These structures are also to be included as mitigation for badgers and otters;
 - bat boxes will be erected in pre-identified locations. In addition, several buildings will be enhanced with bat boxes to provide roosting potential for bats, thus compensating for habitat loss. Similarly, woodland areas lost as part of the scheme will be replaced at nearby suitable locations and existing areas of habitat enhanced;
 - linear habitat planting alongside the scheme will link with bat flyways and within 50m of bat roosts to direct bats over the scheme in an attempt to mitigate against direct road mortality;
 - night-time working will not be permitted without agreement from SNH. Carriageway lighting will only be provided where necessary for road safety;
 - the use of SUDS to manage pollution incidents; and
 - areas of riparian woodland will be created alongside burns to offset habitat loss and minimise disturbance through noise reduction. These woodlands will include species of local importance such as wych elm and aspen as well as willow, birch and alder.
- 6.3.2 A licence can be granted under Section 44 of the Conservation Regulations 1994 that will permit certain actions, which would otherwise be against the law, to be carried out under certain circumstances and where an action is deemed necessary; including where approved development is taking place. Such actions include the killing, injury or taking of bats, or the destruction, damage or obstruction of access to any place used by bats for shelter, protection or breeding including within a dwelling house. The licensing system is provided by SEERAD however, the advice of SNH will be sought prior to any such damage and their advice followed.
- 6.3.3 Three tests must be granted before a licence may be granted and if any of these tests fail the licence application will be unsuccessful. It must be demonstrated that:
- the reasons for the works must be clearly stated;

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

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

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

6.3.5 In relation to the requirements as much information as possible will be provided during the licence application process, including the following:

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

7 Residual Impacts

7.1.1 This section presents the results of the assessment of residual impacts following the effective implementation of appropriate mitigation.

Direct Mortality

7.1.2 Provided the mitigation measures proposed are successfully implemented and all roosts are located prior to felling and demolition works during construction, the risk of accidental deaths of bats would be prevented. Impacts resulting from RTA during operation of the proposed scheme will be significantly reduced although isolated incidences of RTA may still occur. In addition, it is expected that bats will gradually adapt to the new landscape. The provision of safe crossing points including bridges, underpasses and box culverts combined with the provision of planting at the most sensitive areas will therefore maintain the long term viability of bat populations within the route corridor. The long term viability of bat populations within the route corridor is unlikely to be compromised and in this respect potential impacts resulting from direct mortality are anticipated to be reduced from high negative magnitude of Minor to Major significance (pending the value of the resource) to negligible magnitude and Negligible significance.

Habitat Loss

7.1.3 Bats are vulnerable to impacts arising from habitat loss. It is likely that short to medium term habitat loss (in terms of roosting and foraging habitat) will affect bat populations within the route corridor as newly created habitats are unlikely to provide instant good quality replacement foraging, roosting or commuting opportunities until they mature. The loss of roosting habitat, in particular the loss of tree roosts, in the short-term will be mitigated for by using bat boxes or similar structures. Habitat loss in the long term will be mitigated by new habitat creation and enhancement and provided the mitigation measures are implemented successfully the long term viability of bat populations will not be compromised. These residual impacts are assessed to be low negative magnitude and Minor significance in the short to medium terms and negligible magnitude and Negligible significance in the long term.

Habitat Fragmentation and Isolation

- 7.1.4 Despite the incorporation of bridges and culverts enhanced by planting to guide bats safely towards crossing points, construction of the proposed scheme would result in short term residual severance of commuting routes and foraging habitat within the route corridor until new habitat has time to mature and bats adjust to familiar themselves with these new landscape features. Research has suggested that bats will use these structures even if they are long and narrow (Bach & Limpens, 2004). However, there is potential that proposed culverts greater than 100m in length may not be used by bats, especially when water levels are high.
- 7.1.5 In the long term, it is expected that bats would gradually find alternative routes and new features along which to echolocate. Woodland habitat creation and the provision of linear habitats will maintain and enhance connectivity between habitat fragments on each side of the road and along its length in the long term. Habitat fragmentation and isolation residual impacts are assessed as low negative magnitude and Minor significance in the short term and negligible magnitude of Negligible significance in the long term.

Disturbance

- 7.1.6 Impacts from disturbance of roosts and foraging/commuting areas during construction and initial operation of the proposed scheme will, in the short term, occur. However, these impacts will be significantly reduced through the implementation of applicable mitigation measures and sensitive phasing of construction works, especially if considerable effort is made to locate roosts prior to works commencing. Long term disturbance during operation of the scheme is not anticipated to be a significant impact. There is potential for light pollution to be a Major adverse impact at certain locations. It should be noted however, that this adverse residual impact would only apply to some species of bats as lighting may be of benefit to other species of bats. Road lighting has the potential to attract insects and is considered a reliable food source, and while *Plecotus* and *Myotis* species tend to avoid lights to escape predation from birds, pipistrelle bats will swarm around lamps to feed on insects. The residual impacts of disturbance in the short term have been assessed as low negative magnitude and minor significance. In the long term, residual impacts from disturbance have been assessed as negligible magnitude and Negligible significance, with the exception of lighting at Cleanhill Junction as discussed above.

Pollution/Other Indirect Impacts

- 7.1.7 The implementation of measures to prevent pollutants and runoff from entering watercourses or other waterbodies during construction and operation of the proposed scheme is expected to mitigate for all identified impacts. The residual impact assessment has been assessed as negligible magnitude and Negligible significance.

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9 Glossary of Terms and Acronyms

DMRB – Design Manual for Roads and Bridges – Highways Agency guidelines to be taken into account when planning a road development

DWS – District Wildlife Site

EclA – Ecological Impact Assessment – Statutory requirement for the assessment of impacts of proposed development schemes on ecological receptors

Echolocation – Ultrasonic signal used by bats to navigate and locate insect prey

Flight Line (also flyway) – a route, usually along linear or habitat feature, which is used by bats for commuting between landscape features

Hibernation – Extended period of torpor undertaken over the winter

LBAP – Local Biodiversity Action Plan. Local targets and objectives for named species of conservation concern.

Roost – any resting site used by bats including maternity roosts which are used by females and their young, hibernacula which are used during winter hibernation and transitional roosts which may be used at any time

RTA – Road traffic Accident

SINS – Site of Interest to Natural Science

SNH – Scottish Natural Heritage

SSSI – Site of Special Scientific Interest

Torpor – physiological state which bats use to conserve energy during the day and during poor weather conditions

UK BAP – UK Biodiversity Action Plan. National targets and objectives for named species which may be adopted by local authorities to influence management decisions with regard to species of conservation concern.