Aberdeen Western Peripheral Route

Environmental Statement 2007 Additional Survey Report: Bats

October 2007

JACOBS

Aberdeen Western Peripheral Route

Working in partnership

ABERDEEN CITY COUNCIL

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TRANSPORT SCOTLAND

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1 Introduction

1.1 General Background

1.1.1 This is Part 1 of an additional survey report for the AWPR Environmental Statement 2007. The purpose of this additional survey report is to update and complete Appendices A25.3 and A40.3 of the Environmental Statement to include findings of bat surveys undertaken during the summer of 2007.

1.1.2 Part 1 presents the findings for the Southern Leg study area. It provides baseline data including that obtained from surveys undertaken in the summers of 2006 and 2007, and presents a full assessment of impacts on all bat assemblages. Part 2 addresses the Fastlink study area findings.

1.1.3 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).

1.1.4 All tables and figures are structured in this manner.

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

1.1.6 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

1.1.7 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, although the population status of this species in the region is currently unclear (Rob Raynor, SNH, pers.comm.) and Leisler's bats have been recorded foraging near Peterculter (Rydell et al., 1993). 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 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 Bats are conferred legal protection through international and national statutes which recognise the ecological value of these species and provide protection or promote policies that guide their conservation.

1.2.8 All British bat species are listed on Schedule 5 to the Wildlife and Countryside Act (1981) (as amended) (WCA) and protected under Section 9. 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 WCA. In Scotland the WCA has been amended by the Nature Conservation (Scotland) Act 2004 which extends the legal protection afforded to Schedule 5 species including 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.

1.2.9 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.

1.2.10 The WCA and Habitats Regulations also enact the Council of Europe Convention on European Wildlife and Natural Habitats (the Bern Convention 1979) and the Convention on the Conservation of Migratory Species of Wild Animals (the Bonn Convention 1980) to which the UK is a signatory. All species of bat, except for the common pipistrelle, are listed on Appendix II of the Bern Convention, and the Bonn Convention led to The Agreement on the Conservation of Populations of European Bats (EUROBATS).

1.2.11 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.

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

1.2.12 The UK Biodiversity Action Plan (BAP) is the UK government's response to the Convention on Biological Diversity. As part of the UK and local BAPs, Species Action Plans (SAPs) have been developed to guide conservation action for the ecological feature concerned. The presence of a SAP reflects the fact that the species concerned is in a sub-optimal state and requires conservation action. The UK BAP sets out a programme of action to conserve and enhance biological diversity throughout the UK. Local Biodiversity Action Plans (LBAPs) integrate these measures at the local or regional level. 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 UK BAP) for the species concerned.

1.2.13 P. pipistrellus and P. pygmaeus are priority species identified in the UK BAP and have a combined national SAP (Hutson, 1993) 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 and loss of suitable habitat and flyways as well as disturbance of roosts and loss of maternity and winter roost sites in buildings and trees. The UK BAP presents the following targets to which the proposed scheme must have regard:

- 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

1.2.14 The North East Scotland Biodiversity Action Plan contains a LBAP for Daubenton's bat which serves to highlight the need to protect this locally important species which is threatened from roost loss and changes in riparian vegetation and water quality despite their widespread distribution over the country (Racey, undated). The LBAP presents a number of targets toward which the proposed scheme must contribute:

- promote sympathetic management of habitats; and
- maintain up to date records and information on Daubenton's bats and their habitat through monitoring.

1.2.15 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.

1.2.16 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 and which are near the northern edge of their range. Nathusius' pipistrelle is also believed to be rare and no breeding colonies are known this far north (Sue Swift, University of Aberdeen, personal communication). Leisler's bats are considered a vagrant species in Aberdeenshire and no breeding colonies are known this far north.

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 and methods used were determined through professional judgement, best practice guidelines (Mitchell-Jones, 2004, Mitchell-Jones and McLeish, 2004, Roche et al., 2005 and Russ et al., 2006) and through advice from SNH at a meeting on 8th 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 (Highways Agency, 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 (refer to Section 2.6). Although this is narrower than the ideal width for such surveys (Highways Agency, 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 access constraints (see Section 2.6), bat surveys were undertaken over two survey periods (2006 and 2007) and evening surveys at roosts and potential roosts were prioritised up to 200m from the road and where bats were considered more likely to be present.

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 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 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 summer 2006 and 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 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.

Activity Assessment

2.2.13 Activity surveys for the study area were carried out between June and early August 2006 and between May and July 2007 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 cals into sounds

within human audible range using heterodyne techniques and frequency division techniques. Bat Box III, Pettersson D230, Stag bat boxes and Duet detectors were used for heterodyne techniques and AnaBat SD1 Bat Detectors were used for frequency division techniques. Bat calls were interpreted by surveyors in the field or in the office. 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 and which were prioritised as per paragraph 2.2.4 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 were 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 involved a combination of manual and static (AnaBat SD1)_ bat detection techniques to identify the species, number and direction of bats at potential crossing point or in the point likely to be affected by works. Manual techniques were undertaken in the evening only whereas AnaBat surveys were undertaken throughout the night.

2.2.20 Further activity surveys were undertaken at a number of buildings to determine their use by bats in the autumn and the possibility of their use in the winter, based on indications of their usage in the summer and their proximity to the proposed scheme. The buildings subjected to autumn surveys

were: Red Tile Lodge, Eastland Cottage and House, a house next to Eastland Bridge, Rumlins Fauld, The Old Coach House, the International School, Beanshill House, Airy Park Cottage, Moss Side of Auchlea and Fairley Home Farm, which were all identified as having roosts or roost potential during summer surveys. Autumn surveys were undertaken on 11th – 20th October and 7th November 2006 and buildings were surveyed once in the evening and once at dawn where appropriate and where it was necessary to confirm roost status, according to the timings above. Four culverts in Kingcausie and one at East Silverburn, and an ice house in Kingcausie were also checked for the presence of bats during the day, and an evening survey was undertaken at the old quarries at Greenhowe, Guttrie Hill and Hill of Blairs to identify whether these are used by swarming bats.

2.2.21 In addition, further survey effort was used to establish whether there is a population of Leisler's bats in Aberdeen which could potentially be impacted by the proposed scheme. To this end a car transect survey was developed following methods outlined in Roche et al (2005) and Russ et al (2006) to provide coverage of the entire route of the proposed AWPR using frequency division techniques to record bat activity. The transects commenced shortly after sunset and involved a slow (20mph) driven transect with a bat detector aimed upwards out of the car window. The species, time and GPS location of bat activity was recorded. Three transects were undertaken in 2007 (22 May, 21 June, 23 July).

2.2.22 Further attention was given to the locations where Leisler's bats had been recorded previously (Rydell et al., 1993). Static or slow-walked surveys along the river banks were undertaken using hand held bat detectors set at 23kHz to record any Leisler's bat activity. These surveys were carried out once a month for four months in the summer of 2006 at the existing Dee crossing at Peterculter (NGR NJ 858 004); and at the proposed crossing point at the River Don (NGR NJ 881 145). The surveys were carried out between sunset and two hours after sunset, and in the two hours before dawn.

2.2.23 A repeat evening and dawn walked bat activity survey was undertaken in July 2007 in and around Kingcausie where a potential Leisler's bat call had been heard in 2006, specifically to substantiate this potential sighting. The results of all of the Leisler's bat surveys are reported separately from the other bat activity and commuting route data in the baseline section below.

2.2.24 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

2.2.25 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 2006/2007 (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. Car transect surveys were undertaken along public roads following the route of the proposed AWPR from south to north, and occasionally extended beyond the 500m corridor where the road continued outside the study area. The first safe and available opportunities for returning to the study area were taken in each case.

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 2006/2007 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 2006/2007 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 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 2006/2007 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 have been undertaken as described above.

2.3.9 There were slight differences in the timing of bat activity surveys with respect to time of day. During the 2006/2007 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 (Highways Agency, 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 2006/2007 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 or where the buildings were closer to the proposed road.

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 walked transect based loosely on potential habitat areas while simultaneously identifying connecting routes between them. The 2006 surveys focused exclusively on identifying key bat habitat areas. The identification of commuting routes between these areas of habitat was established through separate survey effort using manual and remote bat detector surveys as above in 2006/2007. The methodology followed in 2006/2007 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).

2.4.4 Using the information from Table 1 the relative importance of local bat populations for the 7 species of bats present or possibly present in Aberdeen has been evaluated as follows:

- International importance – Habitats Directive Annex II species (none of the species listed in Annex II occur in Aberdeenshire).
- National importance – rare in Scotland, rare in Britain as specified in the Red Data Book; UK BAP species for which SAPs recommend safeguard of all sites; this includes the Leisler's bat.
- Regional importance – Nationally scarce; rare in the North East Coastal Plain Natural Heritage Future.
- County importance – Rare in Aberdeenshire; LBAP species for which the safeguard of all sites is a SAP recommendations; species for which the LBAP identifies the need to protect all populations above a certain size; this includes Nathusius' pipistrelle for which there is little data.
- Local importance – Restricted distribution or scarce in Aberdeenshire but not threatened or rare. National priority BAP or LBAP species that are not rare in Aberdeenshire and for which the safeguard of all sites is not a SAP recommendation. This includes the common pipistrelle, soprano pipistrelle, Daubenton's bat, and although they are not BAP species, brown long-eared bat and Natterer's bat.
- Less than Local importance – habitat retains few/no features of value to bats and no bats observed using the area for roosting, foraging or commuting during the survey period.

2.4.5 The value attributed to a feature or 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. roosting, 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 based on its assessment (low, medium or high) according to the methods described in Table 2.

2.4.6 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).

2.4.7 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)	Habitats 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. Species Any regularly occurring population of an internationally important species, which is threatened or rare in the UK, i.e. a UK Red Data Book species or listed as occurring in 15 or fewer 10km squares in the UK (categories 1 and 2 in the UK BAP) or of uncertain conservation status or of global conservation concern in the UK BAP. A regularly occurring, nationally significant population/number of any internationally important species.
National (Scottish)	Habitats A nationally designated site 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. Species A regularly occurring, regionally or county significant population/number of an internationally/ nationally important species. Any regularly occurring population of a nationally important species that is threatened or rare in the region or county (see local BAP). A feature identified as of critical importance in the UK BAP.
Regional (North East Scotland)	Habitats Sites 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. Species Any regularly occurring, locally significant population of a species listed as being nationally scarce which occurs in 16-100 10km squares in the UK or in a Regional BAP or relevant SNH Natural Heritage Future area on account of its regional rarity or localisation. A regularly occurring, locally significant population/number of a regionally important species. Sites maintaining populations of internationally/nationally important species that are not threatened or rare in the region or county. Roosts for large numbers of common species, including maternity colonies; and winter roosts/hibernacula maintaining bats through vulnerable stages in their annual cycle.

Ecological Importance	Attributes of Ecological Receptor
Authority area (e.g. County or District) Aberdeenshire /City of Aberdeen	Habitats Sites that are recognised by local authorities e.g. Sites of Interest for Nature Conservation (SINCs) 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. Species 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. Roosts for small numbers of common species which enrich the roost habitat resource at above local level
Local (Immediate local area or village importance)	Habitats 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. Species Populations/assemblages of species that appreciable enrich the biodiversity resource within the local context. Sites supporting populations of county/district important species that are not threatened or rare in the region or county, and are not integral to maintaining those populations.
Less than Local (Limited ecological importance)	Sites that retain habitats and/or species 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 In the assessment of significance of impact, consideration has been given both to the magnitude of impact and to the sensitivity of the receiving environment or species. The sensitivity of a feature was determined with reference to its level of importance although other elements have been taken into account where appropriate. Methods of impact prediction used indirect measurements, correlations, expert opinion, and information from previous developments. Impacts include those that are predicted to be direct, indirect, temporary, permanent, cumulative, reversible or irreversible.

Impact Magnitude

2.5.2 The magnitude of an impact has been assessed for each element of the development. A definition of the magnitude impacts is presented in Table 5 and includes positive impact criteria in accordance with IEEM guidance (2006). The magnitude of each impact was assessed independently of its value or statutory status.

Table 5 – Impact Magnitude

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

Impact Significance

2.5.3 The significance of an impact was determined according to the matrix of importance and magnitude as illustrated in Table 6.

Table 6 – Impact Significance

Magnitude / Importance	High Negative	Medium Negative	Low Negative	Negligible	Positive	High Positive
International	Major	Major	Moderate	Negligible	Moderate	Major
National	Major	Major	Moderate	Negligible	Moderate	Major
Regional	Major	Moderate	Minor	Negligible	Minor	Moderate
County	Moderate	Moderate	Minor	Negligible	Minor	Moderate
Local	Minor	Minor	Minor	Negligible	Minor	Minor
Less than Local	Minor	Negligible	Negligible	Negligible	Negligible	Negligible

2.5.4 The level of significance of impacts predicted on ecological receptors is an important factor in influencing the decision-making process and determining the necessity and/or extent of mitigation measures. Impacts can be beneficial or adverse, either improving or decreasing the ecological status, health or viability of a species, population or habitat. In general, an impact significance greater than or equal to Moderate would require specific mitigation to be undertaken to ameliorate the impact significance to acceptable levels.

2.6 Limitations to Assessment

Health and Safety

2.6.1 Due to physical hazards and the presence of livestock and horses in fields throughout the survey area, and the presence of boggy or unstable ground, including at Hare Moss and in the Moss of Auchlea 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

2.6.2 A limited number of buildings were inspected internally for the presence of bats, due to the difficulty of obtaining homeowner permission and the impracticalities of surveying every building internally. Lack of access permission prevented external assessment of a small number of properties and associated habitats. 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 roosts was not attempted. Similarly no attempt was made to identify roosts in Kingswells due to the distance (more than 400m) from the proposed scheme; activity surveys including commuting route surveys were used to supplement information in this area.

Surveyor Expertise

2.6.3 All survey work was supervised by ecologists with suitable levels of bat survey experience.

2.6.4 All survey work was supervised by at least one of the following ecologists with suitable bat survey experience:

- Claire Hopkins (Ecologist, Jacobs) – Licensed bat worker, 4 years experience with bat surveys;
- Graham Rankin (Senior Ecologist, Jacobs) – 5 years experience with bat surveys;
- Jonathan Guarnaccio (Senior Ecologist, Jacobs) – Licensed bat worker, 5 years experience with bat surveys;
- Richard Roe (Senior Ecologist, Jacobs) – licensed bat worker, 5 years experience with bat surveys;
- Mark Jackson (Ecologist, Jacobs) – 3 years experience with bat surveys;
- Katie Finlinson (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

2.6.5 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 ºC, with an average of 10 ºC. July daytime temperatures were above the seasonal average, night survey temperatures ranged from 12 – 22 ºC, with an average of 15 ºC. 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 ºC, with an average of 11ºC. In the 2007 survey period the weather conditions were varied, with daytime temperatures frequently below the seasonal average, and evening temperatures ranging from 8 - 15ºC, often with mist, light rain or wind. Surveys were postponed on a number of nights due to unsuitable conditions, however bat activity was observed in sub-optimal conditions on many occasions. There have been widespread reports of bat populations suffering in the bad weather in 2007 (Bat Conservation Trust).

2.6.6 During the River Dee and River Don monitoring in summer 2006, the June surveys were undertaken on dry, calm and cold conditions (2-5 degrees), July was dry with light wind and warm (14-16 degrees), August was dry, calm and mild (13 degrees) and September was dry with some light drizzle, calm and warm (15 degrees).

2.6.7 During the car transect surveys in summer 2007, the weather conditions were mild each time with temperatures of 11 – 13 degrees. It was overcast on all three survey evenings. It was misty throughout the May and June surveys and there had been heavy rain earlier in the evening in July.

Roost Location

2.6.8 While staining 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.

Detecting Low Numbers or the Absence of Bats

2.6.9 Bats are extremely mobile and while it is easy to demonstrate their presence in an area, it is extremely difficult to demonstrate absence. Further survey effort may be required in woodland and built environments with bat roost potential where bats were not shown to be present in the 2006/2007 surveys to confirm their absence prior to construction (refer to Section 6).

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 7. 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. No further information on Leisler's bats and their presence in Aberdeen has been found since (pers. comm. Prof. Paul Racey, Aberdeen University).

3.1.3 The Aberdeen 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 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 relatively small and many of the known roosts are outwith the study area. The Dee is however considered to be an important resource for this species.

Table 7 – 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 HA's defined in Appendix 25.1 (Terrestrial Habitats) of the AWPR Environmental Statement 2007 (Jacobs 2007). 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 HA's 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 weather conditions. 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 were identified during surveys being completed in 2007.

3.2.5 Due to access restrictions, some buildings including a number of those in Milltimber were not surveyed (see Section 2.6). Those which are located on or within 50m of the proposed alignment will be surveyed prior to construction as there may be potential impacts on the bat populations using them. Similarly, none of the buildings in Kingswells have been surveyed due to the impracticalities with surveying the area. However, the nearest building on the estate is over 400m from the proposed scheme. Issues with potential commuting routes that connect the estate with foraging areas on the other side of the study area are covered in the report below.

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+ (ie at least 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. Where a "brief pass" is recorded this means that only a short sample of bat activity could be detected; neither species, nor behaviour or other aspect of activity could be detected.

3.2.7 The survey effort was increased in order to identify a potential population of Leisler's bats (see Section 2.2 above). The results of the four-month long monitoring programme at the River Dee and the River Don are shown in Table 8 below. Despite the potential sightings of Leisler's bats reported in 1993 (Rydell et al., 1993), no Leisler's bat activity or unknown bat species activity was observed during the monitoring programme.

3.2.8 In addition, increased survey effort was used in Kingcausie where a potential sighting of a Leisler's bat was made in 2006 during field surveys (see results for Section SL3 below). The 2007 activity surveys did not reveal any further actual or potential Leisler's bat activity and the sighting made in 2006 has not been substantiated.

Table 8 – Results of the River Don and River Dee Bat Monitoring Programme, 2006.

River Don								
	June		**July**		**Aug**		**Sept**	
	Evening	**Dawn**	**Evening**	**Dawn**	**Evening**	**Dawn**	**Evening**	**Dawn**
Date	26/06/2006	30/06/2006	25/07/2006	26/07/2006	30/08/2006	31/08/2006	25/09/2006	26/09/2006
Weather	dry, calm, 2 degrees	dry, calm, 7 degrees	dry, light wind, 16 degrees	dry, calm, 14 degrees	Dry, calm, mild	Dry, calm, mild	dry or light drizzle, calm, mild	Dry, Calm, 14 degrees
Sunset	21:30	-	21:39	-	20:10	-	19:00	-
Sunrise	-	04:00	-	04:55	-	06:06	-	07:00
Survey start	21:40	02:15	21:30	03:35	20:05	04:00	19:10	05:00
Survey finish	23:34	04:00	23:30	05:15	22:15	06:00	21:10	06:45
Results/ comments	No Leisler's, some 55 pipistrelles.	No Leisler's but Daubentons and common/soprano pipistrelles.	No Leisler's. Late arrival of Daubentons and pipistrelles and little foraging activity, possibly as a result of good weather for several weeks and abundant foraging opportunities.	No Leisler's.	No Leisler's. Lots of insects around. Many pipistrelles especially sopranos, and Daubenton's feeding over river and around gorse bushes on banks.	No Leisler's. Many soprano pipistrelles observed doing social behaviour (chasing and calling). Up to 5 bats visible at a time.	No Leisler's. Soprano pipistrelles foraging overhead and along river banks.	No Leisler's. common and soprano pipistrelles foraging along banks near trees. Vanished by 6.30, last seen going towards woodland.

Table 8 (continued) – Results of the River Don and River Dee Bat Monitoring Programme, 2006.

River Dee								
	June		**July**		**Aug**		**Sept**	
	Evening	**Dawn**	**Evening**	**Dawn**	**Evening**	**Dawn**	**Evening**	**Dawn**
Date	26/06/2006	30/06/2006	26/07/2006	27/07/2006	31/08/2006	01/09/2006	26/09/2006	27/09/2006
Weather	dry, calm, 2 degrees	dry, calm, 7 degrees	dry, light wind, 17 degrees	dry, calm, 14 degrees	dry, calm, 13-14 degrees	light rain, calm, 14 degrees	dry, calm, 15 degrees	light drizzle, calm, 10 degrees
Sunset	21:30	-	21:37	-	20:08	-	19:06	-
Sunrise	-	04:00	-	04:55	-	06:08	-	07:00
Survey start	21:45	02:15	21:25	03:10	20:05	03:55	18:40	04:45
Survey finish	23:45	04:00	23:20	04:45	22:05	05:40	20:48	06:45
Results and comments.	No Leisler's. Many Daubenton's and 55 pipistrelles including social calling.	No Leisler's. Observed 45 and 55 pipistrelles .	No Leisler's. Many Daubenton's and pipistrelles observed foraging under the bridge.	No Leisler's.	No Leisler's. Many Daubenton's and pipistrelles foraging and social calling. First bat approx 20:50.	No Leisler's. 55 pipistrelles and Daubenton's bats as well as social calls. 1x55 pipistrelle foraging under bridge. Rain stopped survey.	No Leisler's. Pers. comm. from Ghillie who noted that the bats tend to come from Badger Island first. Some Daubenton's bats foraging by trees and under bridge.	No Leisler's. Few bats observed - 55 pipistrelles and some social calling from bridge.

Table 9 – Survey Results Summary of Car Transect Surveys

Name of Transect	FL Survey 1	FL Survey 2	FL Survey 3	SL/NL Survey 1	SL/NL Survey 2	SL/NL Survey 3
Date of ANABAT survey	22/05/2007	21/06/2007	23/07/2007	22/05/2007	21/06/2007	23/07/2007
Weather conditions	Light rain, calm, 8 degrees	Dry, calm, 12 degrees, foggy	dry, calm, 12 degrees, overcast, rain earlier	Light rain, calm, 8 degrees	Dry, calm, 12 degrees, foggy	dry, calm - light wind, 12 degrees, overcast, rain earlier
First bat	09:52	10:35	10:38	09:35	10:11	10:22
Last bat	11:37	11:46	12:21	11:03	12:27	11:41
Total species	2	2	2	2	2	2
Total passes	45	20	28	19	7	21
Total 55	21	10	10	10	4	8
Total 45	12	8	11	5	2	11
Total myotis	0	0	0	0	0	0
Total any pipestrelle	3	0	0	1	1	0
Total BLE	0	0	0	0	0	0
Total unknown	0	0	1	0	0	0

Section SL1

3.2.9 Section SL1 includes ten Habitat Areas (HA). The section is characterised by several areas of mainly plantation woodland at Duffs Hill and Greenhowe Wood, although several smaller sub-areas are broadleaved / semi-natural woodland. There are several areas of swamp / marsh as well as marshy grassland including the large area at Hare Moss. Areas of improved and semi-improved grassland are interspersed between the above habitats. Linear features include woodland edges/rides in the woods, roads including Causey Maunth Road, tracks and dry stone walls. There are several small waterbodies within Section SL1 including Greenhowe Pond which is in an old quarry with potential as a swarming site although no bats were observed there in October 2006.

3.2.10 This section includes three building roosts at Lochview Croft (small common pipistrelle roost), Mains of Charleston (species unknown but confirmed by presence of droppings) and Causeyport Cottage (anecdotal). Daytime surveys identified some potential roosts in Charlestown and near Duffs Hill, although most properties in this section were assessed as having little or no potential for roosting bats. One potential tree roost (category 2b) has been identified in the section, however most trees were assessed as having low potential due to the predominance of low value conifer plantation.

3.2.11 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.

3.2.12 A total of 27 bat passes were recorded during the 2006 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 HA, 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.

3.2.13 A total of 22 bat passes were recorded at two potential commuting routes (adjacent to Greenhowe Wood and along Causey Maunth Road) during the 2007 manual commuting route surveys in this

section. Of the passes, 20+ were foraging bat passes from common and soprano pipistrelles and one was a commuting bat pass from a common pipistrelle.

3.2.14 Static AnaBat SD1 CF Bat Detectors recorded 8 bat passes from common and soprano pipistrelle bats at Causey Maunth Road but no bat passes were recorded adjacent to Greenhowe Wood.

3.2.15 The results from the Section SL1 are shown in Table 10, Table 11 and Table 12, as well as in Figures 25.4a–b and 25.5a – 25.5b.

Table 10 – Specific Features Within Section SL1

Habitat Area	Feature	Feature Type	Description / Additional information
S1	Hatton Wood	Potential commuting and 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 HA.
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 between foraging areas including Greenhowe Wood and Loirston Loch, and roosting areas including Charlestown. The A90 bisects this Habitat Area with most of the roosting opportunities on the eastern side at Charleston. The area includes one roost identified during daytime survey at Mains of Charleston due to the presence of a small number of recent bat droppings near the garage door (2006). Emergence survey at Lochview Croft in 2006 recorded one common pipistrelle roosting in a barn. The bat was then observed commuting east towards Loirston Loch. A foraging pipistrelle was recorded in the vicinity during the emergence survey and during previous survey in 2004. Daytime surveys in 2006 and 2007 identified four high potential roosts, two of which had follow up emergence surveys;, however no bats were observed emerging. Many more buildings in this Habitat Area were assessed as being of roost potential 2b. Night activity surveys in 2006 recorded four passes by common pipistrelles travelling north along the track east of Hatton Cottage. 2007 commuting route surveys along the track adjacent to Greenhowe Woods identified a small number of pipistrelle bats foraging along the woodland edge, although no commuting activity was recorded and the Anabat detectors did not record any bat passes.
S3	Wood/scrub mosaic east of Greenhowe	Foraging and potential commuting habitat.	This Habitat Area contains an extensive area of 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, although no swarming activity was recorded in October 2006 surveys; the water provides potential foraging habitat suitable for Daubenton's and pipistrelle bats. The features within this Habitat Area are likely to provide medium to high value foraging habitat. Night activity survey did not cover this HA, which was originally surveyed in 2004, although bats were recorded foraging along the edge of the area during 2007 commuting route surveys as per S2.
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 and evening activity surveys were not undertaken in the area.

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 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 may provide commuting routes across the open landscape. Activity survey recorded one commuting soprano pipistrelle pass in the east of the Habitat Area along a road, and three passes of foraging common pipistrelle near Fair View. Four buildings were surveyed during the day in 2006 but these were found to have low or no roost potential.
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 potential building roosts (category 2b). Night activity survey recorded a pipistrelle commuting along the forest / field boundary in the southwest of this HA. Forest edges, rides and tracks are likely to provide commuting routes between areas of higher value foraging and roosting habitat including Greenhowe Pond and wet habitats as per S3, although conifer plantation woodland is generally of low value to foraging bats.
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 and for sheltered foraging, this area is likely to be of relatively low value in terms of roosting.
S8	Agricultural fields west of Duff's Hill	1 Roost, Foraging and commuting habitat, potential building roosts.	Series of improved, 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 as per S7. Surveys performed in 2006 identified several potential roosts including several buildings at Duff's Hill (roost category 2a), although no bats were recorded emerging on the night of survey in 2007. A further six potential roosts were identified on day survey. A roost (category 1b anecdotal) was identified in the 2007 surveys at Causeyport Cottages which has several potential access points into the roof of the building including a split in the chimney where the landowner reported hearing squeaking in 2006.
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. An activity survey in 2006 recorded two pipistrelles foraging near Clifton Cottage which was assessed as being of potential roost category 2b. Most properties in this Habitat Area including those at the Crossroads were found to have little or no roost potential due to the absence of potential access points. 2006 and 2007 surveys recorded potential roosts (category 2a and 2b) at Hare Moss Cottages, although no bats were recorded emerging during 2007 surveys. Commuting route surveys undertaken in 2007 identified the presence of commuting common and soprano pipistrelle bats along Causey Maunth Road which is likely to connect roosts to the south of the scheme with foraging opportunities in the north including Cran Hill Wood.

Habitat Area	Feature	Feature Type	Description / Additional information
S10	Hare Moss	Potential foraging and commuting habitat.	Hare Moss 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 (see Section 2.6), 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. The size of the resource provided, its connectivity with other resources including the River Dee and habitats along the Burn of Ardoe and the relative scarcity of other such habitats in the vicinity are likely to increase the value of this habitat.

Table 11 – Bat Activity Results for 2006 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	Haremoss Cottage	Pipistrelle	7	F	Haremoss 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

Table 12 – Bat Activity Results for 2007 Section SL1

Name of Transect Area	Greenhowe Woods		Causey Mounth Road	
Survey Method	AnaBat	Manual	AnaBat	Manual
Date of survey	20/06/07	09/07/07	30/05/07	09/07/07
First Bat	No bats recorded.	22.41	22.27	22.54
Last Bat		23.28	03.25	23.33
Total species		2	2	1+
Total passes		13+	8	9
Total Soprano Pipistrelles		3	4	0
Total Common Pipistrelles		10+	3	8
Total Myotis Species		0	0	0
Total Any Pipistrelle Species		0	1	1
Total Unknown species		0	0	0
Summary of information gathered at site	Soprano and common pipistrelles recorded foraging in Greenhowe Wood. No commuting was recorded.		Common pipistrelles observed commuting along gorse field boundary that orginates north of Kingshill. The data collected from the AnaBat supports the information collected from the manual transect but also shows the presence of soprano pipistrelles.	

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

Section SL2

3.2.16 Section SL2 contains seven HA's. The section is dominated by semi-improved and improved grassland with marshy grassland and scrub, notably at Hare Moss (as per SL1). There are several substantial areas of woodland including broadleaved and native species adjacent to Shanna Burn Wood, at Hill of Blairs and Whitestone Wood. Several waterbodies, burns, pools and wet drains/ ditches are also present, and Clochandighter is a large area of conifer plantation woodland.

3.2.17 This section contains around 18 properties that were identified as having roost potential (category 2a and 2b) daytime surveys, although bats were not observed during emergence surveys at four of these properties and no confirmed roosts were identified. Several areas have been identified where individual trees or groups of trees have potential for use as roosts (category 2a or 2b).

3.2.18 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. Commuting routes connecting these HA's and features outwith the study area have also been identified. 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 and the River Dee to the north of the study area.

3.2.19 During the 2006 acitivity 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.

3.2.20 A total of 75+ bat passes were recorded during the 2007 manual commuting route surveys in this section. Of the passes, 48+ were foraging bat passes and 30 commuting bat passes from common and soprano pipistrelles. Two social calls were also recorded from a common and a soprano pipistrelle.

3.2.21 Static AnaBat SD1 CF Bat Detectors recorded 694 bat passes from common and soprano pipistrelle bats and Myotis bats (presumed to be Daubentons bats) between six commuting routes.

3.2.22 The results from Section SL2 are shown in Table 13, Table 14 and Table 15, and in Figures 25.4b–c and 25.5b–c.

Table 13 – Specific Features Within Section SL2

Habitat Area	Feature	Feature Type	Description / Additional Information
S11	North of Sunnyside	Foraging and commuting habitat.	Small area of 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 during 2006 surveys. 2007 season commuting route studies were undertaken on the eastern road between Clochandighter and Shanna Burn Wood. Anabat survey results revealed many pipistrelle and a few Myotis sp. (presumed Daubenton's bats due to proximity to wet habitats at Cowford and Shanna Burns) bat passes along the road, and a small number of commuting pipistrelle bats were recorded manually shortly after sunset indicating that the road connects roosting and foraging habitat possibly in Shanna Burn Wood and Clochandighter.
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 as per S11 and S13, and to woodland areas at Shanna Burn Wood. Roosting potential is low due to absence of suitable crevices in the young trees. Activity surveys in 2006 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. 2007 commuting route survey results are described as per S11 and S13.
S13	Agricultural fields around Sunnyside to Causeyport	Foraging and commuting habitat, potential tree /building roosts.	A large area comprising a series of improved and horse-grazed semi-improved fields. Small copses of broadleaved woodland as per S11 and S12 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. Linear field drains (Cowford and Heathfield Burns) and ditches are present which are likely to provide high foraging habitat as well as commuting potential including access to foraging resources such as Hare Moss as per S10. Activity surveys and commuting route surveys in 2006-2007 confirmed the use of three roads in the Habitat Area by soprano and common pipistrelle and Myotis bats (presumed to be Daubenton's bats due to the presence of wet habitats nearby) for commuting between foraging areas including Clochandighter, Shanna Burn Wood, and roosting areas including Auchlunies and potentially Bishopston, although Causey Maunth Road is also a commuting route (as per Section SL1). This area includes up to 16 properties (some with multiple buildings) with identified roost potential. Two trees near Haremoss 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. An additional potential roost (2b) was identified in the 2007 surveys.
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 which provides some shelter. The woodland edges / rides are also likely to be used as commuting habitat. A reservoir in the woodland interior is likely to be a foraging area. The woodland is connected to higher value foraging habitat and roosts including Auchlunies to the north by commuting routes as per S13.

Habitat Area	Feature	Feature Type	Description / Additional Information
S15	Whitestone Wood and Hill of Blairs	Commuting and foraging habitat, potential tree and building roosts.	Mature conifer plantation with rich ground flora is dominant within this HA. particularly within Hill of Blairs which also has two small ponds. Areas of dry heath, wet heath, bog and scrub also exist within Hill of Blairs, 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 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. Within this area, bats were recorded commuting along linear features such as woodland edges and rides, tracks and gorse lined stone walls. Bats recorded during 2006 activity surveys include soprano and common pipistrelles, however a probable recording of Daubenton's bats was made at the old quarry pond. The Habitat Area contains two potential building roosts (category 2a), however no bats were observed emerging from Whitestone or Clyanthus Lodge on the night of survey. AnaBat surveys performed in 2007 recorded high levels of soprano and common pipistrelle bat activity along the roads at Burnhead and Merchant's Croft located in the southwest of the HA. As per S16.
S16	Agricultural fields to the east of Burnhead to Greenloaning	Commuting and foraging habitat, potential tree and building roosts.	Improved grassland dominates this Habitat Area with some marshy grassland around Whitestone and Burnhead Burns providing foraging habitat. Trees and hedgerows are present within some of the fields and surrounding the HA, as are dry stone walls, providing potential foraging and commuting habitat. The area contains severa; properties identified as potential roosts, however, no bats were observed emerging from Greenloaning in 2006 and the row of cottages at Burnhead was not assessed as having high roosting potential. A track lined with mature beech trees forms an important commuting and foraging route for pipistrelles, confirmed during 2006 activity surveys, and potential for roosting. 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 (in close proximity to the roost at Auchlunies). 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. 2007 manual and AnaBat commuting route surveys recorded high levels of soprano and common pipistrelle bat activity along the Burnhead and Merchant's Croft roads, confirming their importance to soprano and common pipistrelles foraging and commuting north and south between foraging areas in Kingcausie, at Hill of Blairs, Shanna Burn Wood, Clochandighter and Craigentath. In particular 7 soprano pipistrelles were observed commuting rapidly from north to south along the road at Burnhead.

Table 14 – Bat Activity Results for 2006 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.
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.

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

Grid Reference	Habitat / location	Species	Number of Bat Passes	Activity[2]	Notes
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	Over pond one bat, 1-4m.
NO 883 990	Hill of Blairs	Soprano Pipistrelle	3	F	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.
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.

Table 15 – Bat Activity Results for 2007 Section SL2

Name of Transect Area	Bishopston (CR31)		Eastern Road north of Clochandighter (CR30)		Western Road north of Clochandighter (CR29)		Merchants Croft (CR26)		Burnhead (CR24)	
Survey Method	AnaBat	Manual	AnaBat	Manual	AnaBat	Manual	AnaBat	Manual	AnaBat	Manual
Date of survey	11/07/07	27/05/07	25/07/07	27/05/07	20/06/07	11/07/07	24/05/07	18/06/07	12/07/07	22/06/07
First Bat	22.11	No bats recorded	22.05	22.22	23.09	22.27	21.50	22.12	22.12	22.38
Last Bat	03.35		04.26	23.13	01.51	23.39	03.25	23.21	03.46	23.27
Total species	3		3	2	2	1	2+	2	3+	2+
Total passes	185		320	3	6	5	63	28+	120	19
Total Soprano Pipistrelles	62		280	2	4	5	38	13+	38	16
Total Common Pipistrelles	107		35	1	2	0	19	15+	73	2
Total Myotis Species	0		3	0	0	0	0	0	1	0
Total Any Pipistrelle Species	14		2	0	0	0	0	0	0	0
Total Unknown species	0		0	0	0	0	0	6	1	6
Summary of information gathered at site	No bats were recorded in the manual transect, possibly due to the cold temperatures. However the data collected from the AnaBat survey shows high bat activity from soprano and common pipistrelles. It is likely that the road is used as a commuting route connecting roosts (possibly including Bishopston, given the proximity to the buildings) and foraging areas.		AnaBat survey shows high bat activity from soprano and common pipistrelles. A Myotis species (likely to be Daubenton's bat) was also detected. Only three passes were recorded during manual surveys, confirming the presence of pipistrelle bats which were observed commuting south – north earlier on and north – south later, presumed between roosts and foraging including Shanna Burn Wood where there is a known roost (Auchlunies).		Common and soprano pipistrelles observed commuting along road verge and wall between North and South Heather Knowe from north to south shortly after dusk. The data collected from the AnaBat supports the information collected from the manual transect and also shows that common pipistrelle bats use the area. Road likely to connect roost at Auchlunies and foraging to the south including in Clochandighter.		Pipistrelle bats were recorded foraging and commuting. Commuting bats were recorded travelling in both directions East and West, North West and South East, North and South. The data collected from the AnaBat supports the information collected from the manual surveys.		Several pipistrelle (mainly soprano) bats were recorded foraging and commuting. Commuting bats were recorded travelling in both directions North and South. The data collected from the AnaBat supports the information collected from the manual transect but shows a high proportion of common pipistrelles. A Myotis speces was also detected.	

Section SL3

3.2.23 As explained previously, this section of the proposed AWPR has been subject to additional survey effort, in order to identify the presence of a population of Leisler's bats. No Leisler's bats were recorded during the 2006 monitoring programme although the value of the River Dee for a large number of pipistrelle and Daubenton's bats was noted and commuting, foraging and social behaviour was observed over the survey period. The results of the surveys are shown in Table 8 above.

3.2.24 Section SL3 contains 15 HA's. This section includes important water features such as the River Dee, Crynoch Burn, Blaikiewell Burn and several minor burns / ditches with associated riparian and wet woodland and marshy habitats. This is the most wooded section in the proposed AWPR, with the juxtaposition of many undisturbed and optimal foraging and roosting habitat resources and excellent connectivity via roads, watercourses and other linear features between these key areas of bat habitat. Predominant habitat types include broadleaved and conifer plantation and semi-natural woodland, interspersed with improved and semi improved grassland, arable fields and grazed parkland.

3.2.25 The section includes eleven building roosts at Red Tile Lodge (large quantity of droppings, no bats confirmed during evening surveys), a cottage at Eastland Bridge, Eastland Cottage and House, Rumlin's Fauld (brown long-eared bats), the Old Coach House (pipistrelle maternity roost) and a building in the Camphill Estate (pipistrelle maternity roost). Anecdotal records of roosting bats were identified at Storybook Glen, the Old Mill Inn and a building in the Camphill Estate, and a roost was identified in a tree in Kingcausie. Many other properties/buildings were identified as having roost potential, and Kingcausie, the banks of the Dee and Crynoch Burn and many locations in Camphill and Milltimber contain trees and groups of trees with cracks and crevices with roost potential. .

3.2.26 Four culverts/bridges in this section have been identified as having medium potential for roosting due to the suitability of location and presence of suitable gaps and cracks.

3.2.27 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 Storybook 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.

3.2.28 The 2006 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 whist 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.

3.2.29 Five static AnaBat detectors were placed in Kingcausie in June 2007 to record any potential Leisler's bat activity. While no Leisler's bats were detected, high levels of bat activity, from species including brown long-eared bats, soprano and common pipisrelle bats, Myotis bats (Natterer's and Daubenton's bats) were picked up on the detectors, indicating the high quality of the habitat in this area.

3.2.30 Repeat activity surveys undertaken in 2007 in Kingcausie with the aim of identifying potential Leisler's bat activity did not reveal any confirmed Leisler's bat sightings, and the species composition recorded was the same as in the 2006 surveys. While the 2007 surveys revealed similarly high levels of pipistrelle and also recorded Daubenton's bat activity, the results of the 2007 survey are not considered to add further significance to those results obtained in 2006 and are therefore not discussed in detail.

3.2.31 A total of 53 bat passes were recorded during the 2007 manual commuting route surveys in this section. Of the passes, 32+ were foraging bat passes from common pipistrelles, soprano pipistrelles and a Myotis species (presumed Daubenton's) 21+ were commuting passes from common and soprano pipistrelles. As per Section SL2 a road at Burnhead was confirmed to be a commuting route for pipistrelle bats travelling south just after sunset from the direction of Kingcausie toward Craigentath. Blaikiewell Burn, the South Deeside Road, the River Dee, the road to Milltimber and the Old Deeside Line were all found to accommodate commuting bats during surveys in 2006 – 2007.

3.2.32 Static AnaBat SD1 CF Bat Detectors recorded bat passes from common and soprano pipistrelles bats between four commuting routes in this section. At South Deeside Road, two Anabat surveys were completed. The first survey recorded 285 passes including 167 soprano pipistrelles, 100 common pipistrelles and 1 Myotis bat (presumed to be a Daubenton's bat due to the proximity to optimal foraging habitat at the River Dee). The second survey recorded 20 passes including 16 soprano pipistrelles, 1 common pipistrelle and 1 Myotis species, again presumed to be Daubenton's. At Old Deeside Line Railway, 207 passes were recorded including 90 soprano pipistrelles and 98 common pipistrelles. At the Road to Milltimber, 106 passes were recorded including 45 soprano pipistrelles, 57 common pipistrelles. At North Deeside Road, 4 passes were recorded including 3 soprano pipistrelles and one common pipistrelle.

3.2.33 The results from Section SL3 are shown in Table 16, Table 17 and Table 18 and in Figures 25.4c–d and 25.5c–d.

Table 16 – 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. A static AnaBat detector was deployed at NO875989 along this feature on 19th June 2007 and recorded 119 bat passes from two species of pipistrelle bat (soprano dominant) and a single Myotis bats (possibly Natterer's bat) pass. Red Tile Lodge was identified as a roost during the day survey owing to the presence of large quantities of droppings beneath a hole above the front door, although no bats were observed exiting during emergence surveys and the species has no't been confirmed (likely to be pipistrelle). Clyanthus Lodge was identified as a potential roost (2a), although again no bats were observed emerging on the night of survey although the garden and surrounding woodland were observed to provide foraging habitat for common and soprano pipistrelles. The tracks were also used as a commuting route. Anabat surveys performed in 2007 recorded high levels of soprano and common pipistrelle bat activity at Burnhead located in the southwest of the study area as per Section SL2. The road to Burnhead which borders this Habitat Area and is contiguous with the avenue of trees through this Habitat Area is likely to represent a significant commuting route along which bats roosting in Kingcausie can fly towards features in the south.
S18	Durris Forest	Foraging and commuting habitat.	Large area of plantation woodland, of predominantly conifer origin, but with broadleaved trees, with foraging potential, especially along the edges of Crynoch Burn as per S22. The part of the area within the study area is largely mature conifer with low inherent roost value. However, it forms part of a larger area of value, which includes Kingcausie and Cleanhill Wood. An activity survey in 2006 recorded both commuting and foraging pipistrelle bats along the track.

Habitat Area	Feature	Feature Type	Description / Additional information
S19	Blaikiewell Farm	Foraging and potential 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 as per S22. The western edges of this Habitat Area are lined with shrubs approaching hedgerows and are likely to be of medium to high value for commuting and foraging due to proximity to Crynoch Burn, assessed as per S22. Activity surveys in 2006 covered only a small part of this area due to the presence of stock, and did not record any activity. An emergence survey at Blaikiewell Farm in 2007 recorded low levels of bat foraging activity around the buildings.
S20	Cleanhill Wood	Tree roost, foraging and commuting habitat, potential building / tree roosts.	Mature conifer plantation with inherently low foraging, commuting and roosting habitat potential dominates overall. However, this Habitat Area also contains significant amounts of semi natural broadleaved woodland, particularly to the east and along rides. Roost potential was recorded in buildings at Blair Crynoch and a number of trees have been identified as having high potential for use as roosts, with one displaying signs of probable past use. Night survey in 2006 indicated the quality of habitat within this Habitat Area and the connectivity between other HA's of value. Many bats were recorded foraging along the woodland edges and along some of the tracks within the wood. The majority of species were common and soprano pipistrelles, although Natterer's and Daubenton's were also recorded. The Habitat Area is subject to low disturbance levels. The area forms part of the green corridor and wooded area along Deeside.
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 assessed as being of low value to bats. The edge habitat may be of low to medium value for commuting and foraging as per S22. One building with bat roost potential lies within the corridor as identified on a day survey in 2006. 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 and a mosaic of grassy habitats lines much of the HA. Crynoch Burn passes through the amenity parkland of Storybook Glen, where the day survey identified many trees with high roosting potential. Blaikiewell Burn and associated foraging and commuting habitat is situated on the western side of the road edging the southwest border of Cleanhill Wood as per S20. Although bats are also likely to be following the edge of the adjacent woodland, night surveys indicated these combined linear features provide important foraging and commuting habitat. A culvert on Blaikiewell Burn has been assessed as having medium roosting potential. The Habitat Area includes Blaikiewell Burn and the road to the south of Kingcausie along the woodland edge, with associated pools, tracks, woodland edges and boggy areas which harbour insects suitable for a range of bat species to feed, and connect adjacent HAs including connecting with the commuting route along the road past Burnhead. 2006 activity surveys demonstrated that the length of Crynoch Burn is of high value to bats for both commuting and foraging with very low levels of disturbance and extensive invertebrate availability. 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. The Habitat Area includes two building roosts at Storybook Glen (based on anecdotal evidence) and the house adjacent to Eastland Bridge where droppings were recorded but no bats were recorded entering or emerging during evening surveys despite excellent weather conditions. The majority of bats detected during 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 where optimal foraging opportunities exist. Commuting route surveys performed in 2007 recorded high levels of soprano and pipistrelle bat foraging activity at Blaikiewell Burn and Road and commuting between foraging areas; and at Burnhead as per S16/S17 in the southwest of the study area.

Habitat Area	Feature	Feature Type	Description / Additional information
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, shrubs and hedgerows located on field boundaries. A small broadleaved woodland and wet woodland exist in the Habitat Area with high potential foraging value. 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, although emergence and activity surveys in 2006 – 2007 did not reveal any emergence. A large oak tree in the garden of Eastland House was assessed as having some potential for use as a roost. Sixteen pipistrelle bats were recorded emerging form a presumed maternity roost at Eastland Cottage and another, smaller roost, was confirmed in adjacent Eastland house. Both were confirmed to still be in use in the autumn. Activity as well as emergence survey records indicate the high value of the Habitat Area to foraging, commuting and roosting bats, confirming the use of the woodland edges and field boundaries for foraging and commuting. 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. A static AnaBat survey was undertaken at NO864995 and 16 pipistrelle bat passes were recorded confirming that the road running through the estate is used for commuting and foraging bats.
S24	Kingcausie	Two building roosts, 1 tree roost, 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 origin, and includes a mix of broadleaved and conifer. This provids roosting and 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 enhances the foraging resource and runs through three culverts with roosting potential. The two arable fields within this Habitat Area 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 although no emergence was recorded during 2007 emergence/activity surveys. A further 11 trees with predominantly high roost potential were identified within this HA. Many of the estate buildings were 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 (also confirmed to be used in the autumn). Thrtreen bats including common and soprano pipistrelles and brown long-eared bats were recorded emerging from Rumlin Fauld (also used in autumn by brown long-eared bats), A tree roost was recorded behind the Coach House in autumn 2006. A small well house is situated adjacent to Rumlin Fauld, and has been assessed as being a potential roost (2a) with potential as a hibernaculum. Recordings from emergence, activity and commuting surveys in 2006 and 2007 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. In 2006 a single sighting of a pair of bats thought to be Leisler's bats were recorded, although these have not been substantiated by further survey effort. The tree avenue in the north of this Habitat Area was confirmed to support commuting bats coming from the estate and going toward the River dee and returning. A static AnaBat survey was undertaken along this feature at NJ 862 003 and recorded over 300 bat passes from 4 species (two pipistrelle species, Daubenton's and brown long-eared bats). Further static AnaBat detector surveys were undertaken in fields in the estate (NO862000 and NO865001) and recorded respectively 68 bat passes including two pipistrelle species and Daubenton's bats; and 192 passes from pipistrelles and Natterer's bats. The Habitat Area 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). Manual night time surveys identified commuting and foraging common and soprano pipistrelles moving in all directions. Anabat surveys performed in 2007 recorded high levels of soprano and common pipistrelle bat activity and a Myotis bats on the South Deeside Road which is located in the northeast of the study area.

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 and no signs of bats are now visible. 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	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 HA's (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.
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 along the banks of the River Dee. 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. Anabat surveys performed in 2007 recorded high levels of soprano and common pipistrelle bat activity and a Myotis bats on the South Deeside Road. This commuting route provides a linear feature bordered by broadleaved trees and with high value to bats. It is likely to be of strategic importance as it complements the River Dee in providing a linear route connecting key HA's along Deeside.
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 as per S27. 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 in 2006 including the monitoring surveys for Leisler's bats (see Table 8) 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 water quality is excellent (SEPA) and is likely to support large numbers of aquatic invertebrate prey. The River Dee is also a vital connection between roosting and foraging habitats up-and downstream and throughout the region.
S29	Agricultural fields south of Milltimber	Commuting and foraging habitat, potential building roosts.	A mix of improved and arable fields with low inherent value to bats. Dense gorse scrub lines the roadside and floodplain edges, but overall, tree/shrub cover is occasional. The habitat of value to bats within this Habitat Area is likely to be the field edges which provide linear commuting and foraging habitat of medium to high value. Milltimber Farm was identified in 2007 as having roost potential But emergence surveys at Milltimber Farm did not reveal any emergence although bats were seen commuting from the direction of Milltimber Brae shortly after sunset. Activity surveys in 2006 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. Anabat surveys performed in 2007 recorded high levels of soprano and common pipistrelle bat activity along the road to Milltimber which is located in the centre of this HA, and which represents a significant commuting route between the roosting area of Milltimber (S32 – S33) and the foraging and commuting route at the River Dee (S28).
S30	Camphill	Two building roosts (one	This area comprises of modern buildings with amenity grassland and sculptured gardens as well predominantly broadleaved semi-natural

Habitat Area	Feature	Feature Type	Description / Additional information
	School	anecdotal), potential building/ tree roosts, commuting and foraging habitat.	woodland. Tree roost survey identified one oak within the grounds with some roost potential. Camphill House was confirmed as a pipistrelle roost during emergence surveys with 11 soprano pipistrelle bats observed emerging from at least two exit points in the roof during the survey (early August 2006), presumed to be a small maternity roost. Witiko has also supported roosting bats according to site staff, although no further information is known and no bats were observed on the night of survey. 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, with many pipistrelle bats recorded within the estate over two nights of survey work including commuting along the edges. This indicates the high value foraging habitat, especially significant due to the strategic location of this Habitat Area along a commuting route between the River Dee and Milltimber (S29). Anabat and manual commuting route surveys performed in 2007 recorded high levels of soprano and common pipistrelle bat activity along the road to Milltimber which is located in west of this HA.
S31	Deeside Old Railway Line	Foraging and commuting habitat.	The track along a former railway line contains abundant trees and shrubs. Therefore, 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). Anabat surveys performed in 2007 recorded high levels of soprano and common pipistrelle bat activity in this HA. Night time manual surveys along the Old Deeside Railway recorded high level of soprano pipistrelle bat activity commuting and foraging along the railway line, including at least 9 bats which flew past along the feature in quick succession shortly after sunset from east to west although the exact roost location was not discerned.

Table 17 – Bat Activity Results for 2006 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 pipestrelle.
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.
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.

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

Grid Reference	Habitat	Species	Number of Bat Passes	Activity[3]	Notes
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.
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.

Grid Reference	Habitat	Species	Number of Bat Passes	Activity[3]	Notes
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.
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.

Grid Reference	Habitat	Species	Number of Bat Passes	Activity[3]	Notes
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.
NJ 857 004	River Dee	Common + soprano Pipistrelle	2	C	Along river (too dark to see).
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 + river edge.
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.
NJ 860 005	River Dee	Common Pipistrelle	4	C	Along river edge.
NJ 861 006	River Dee	Common Pipistrelle	5	C/F	Along river edge.
NJ 862 007	River Dee	Common Pipistrelle	8	C/F	Along river edge / verge.
NJ 858 004	River Dee	Daubenton's + ommon 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.

Grid Reference	Habitat	Species	Number of Bat Passes	Activity[3]	Notes
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.
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.

Table 18 – Bat Activity Results for 2007 Section SL3

Name of Transect Area	Blaikiewell Burn (CR23)		South Deeside Road (CR34)		Road to Milltimber (CR35)		Old Deeside Line Railway (CR36)		North Deeside Road (CR37)	
Survey Method	AnaBat	Manual	AnaBat (survey 1)	AnaBat (survey 2)	AnaBat	Manual	AnaBat	Manual	AnaBat	Manual
Date of survey	11/07/07	22/06/07	21/06/07 (Survey 1)	28/05/07 (Survey 2)	11/07/07	28/05/07	13/06/07	25/05/07	13/06/07	No survey carried out.
First Bat	22.18	22.20	22.26	22.00	21.37	22.15	22.20	22.03	22.18	
Last Bat	03.58	22.38	03.35	01.37	03.58	22.57	03.38	22.54	23.25	
Total species	3+	2	4+	3+	2+	2	2+	1	2	
Total passes	175	20+	285	20	106	18	207	35+	4	
Total Soprano Pipistrelles	89	16+	167	16	45	15	90	35+	3	
Total Common Pipistrelles	67	4	100	1	57	0	98	0	1	
Total Myotis Species	4	0	1	1	0	3	0	0	0	
Total Any Pipistrelle Species	0	6	16	1	2	0	14	0	0	
Total Unknown species	0	2	0	1	2	0	5	0	0	
Summary of information gathered at site	Several pipistrelle bats were recorded foraging and commuting along the road and the burn. Commuting bats were recorded travelling in both directions west and east along the centre of the road where vegetation forms a natural tunnel, and along vegetation at the sides of the road. The data collected from the AnaBat supports the information collected from the manual transect. The Burn and road form an excellent foraging habitat resource and link other key HA's to the west and east.		AnaBat data collected from the survey 1 showed higher bat activity than the second; both recorded pipistrelle bat activity with the additional presence of a Myotis species presumed to be Daubenton's bat due to the proximity to the River Dee.		Main foraging and probable commuting route between the Old Deeside Railway and Milltimber and the River Dee with both species of pipistrelle and Daubenton's bats recorded flying north and south during manual surveys. No commuting along roadside but social calls were recorded. AnaBat data supports data collected from manual transect although no Daubentons bats were recorded.		Important foraging and commuting route for soprano pipistrelle bats commuting in both directions fincluding nine bats shortly after sunset flying quickly from a presumed roost in the east toward the west along the old railway. AnaBat data shows only the presence of soprano pipistrelles.		AnaBat data collected shows a low presence of pipistrelle bats although activity surveys undertaken in 2006 and 2007 demonstrated moderate numbers of foraging bats. The use of the road as a commuting route has not been confirmed.	

Section SL4

3.2.34 Section SL4 contains eight HA's. 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.

3.2.35 Eight roosts were identified in this section and emergence surveys were undertaken at three of these. No bats were observed emerging during surveys at Airy Park Cottage or Beanshill House. However, a pipistrelle and brown long-eared roost was confirmed at The International School. The roost is likely to represent a maternity roost for these species, and may also provide winter hibernation opportunities. Two roosts within Milltimber were identified by the Aberdeen Bat Group (Table 7). Many more potential roosts including category 2a and 2b buildings were recorded (three of these were subject to emergence surveys, but no bats were seen emerging). This section of the study area also includes many trees and groups of trees with high roost potential, in particular within Milltimber and on tree lined roads and woodlands.

3.2.36 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.

3.2.37 Of the bat passes recorded during the 2006 activity survey the majority were common or soprano pipistrelles, 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.

3.2.38 A total of 28 bat passes were recorded during the 2007 manual commuting route surveys in this section. Of the passes, 27 were foraging bat passes from common and soprano pipistrelles.

3.2.39 Static AnaBat SD1 CF Bat Detectors recorded bat passes from common and soprano pipistrelle bats between five commuting routes. The use of all five potential commuting routes at Culter House Road, Milltimber Junction, Contlaw Road, Airy Park Cottage and a track between Beanshill and Contlaw Road by bats were confirmed although only small numbers of bats were recorded at all except Culter House and Contlaw Road, possibly due to the overall lack of resources in this predominantly agricultural and exposed landscape. Commuting behaviour was only confirmed at Culter House Road, Airy Park Cottage and the track between Beanshill and Contlaw Road although the linear feature at Culter House Road represents a long-distance commuting route connecting foraging and roosting habitats.

3.2.40 The results from Section SL4 are shown in Table 19, Table 20 and Table 21, and in Figures 25.4d–e and 25.5d -25.5e.

Table 19 – 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, potential hibernating.	Amenity grassland dominates 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. Not all buildings in Milltimber were surveyed (see Section 2.6 above), however many of those that were surveyed revealed potential for roosting. The International School was surveyed in autumn 2006 and a brown long-eared bat and a pipistrelle bat were observed leaving from two separate access points in the roof of the old building. A further survey in summer 2007 a single brown long-eared bat emerged from under a ridge tile and 4 common pipistrelle bats left around 20 – 50 minutes after sunset, despite poor weather conditions on the night of survey. The school is likely to be used as a summer roost and potentially a

Habitat Area	Feature	Feature Type	Description / Additional Information
			winter roost by pipistrelle and brown long-eared bats. West Lodge and Culter Lodge were also identified as roosts on day survey at West Lodge, Culter Lodge due to the presence of droppings. Aberdeen Bat Group indicated the presence of another roost within this area (Table 7). Activity surveys in 2006 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. The proximity to the River Dee also makes this area of strategic value for roosting. Culter House Road may represent a commuting route for bats flying between roosting and foraging habitats although this was not substantiated by commuting route surveys in 2006/2007.
S33	Milltimber	One known roost, further potential roosts, foraging and commuting habitat.	This Habitat Area consists of relatively large dwelling houses with associated gardens creating a mosaic of habitat types including mature scattered trees which offer excellent and varied foraging habitat. The Aberdeen Bat Group provided a record of a known roost within this area (Table 7). Comprehensive building and tree roost surveys were not attempted (see Section 2.6) but cursory observations suggest that it is likely that some of the trees and buildings within this area are used as roosts. Similar to S32 footpaths, minor roads, and woodland edges provide commuting habitat. Day time surveys in 2007 identified many buildings with roost potential along the Deeside road and Milltimber Brae as per S32. General activity surveys and emergence surveys around Milltimber Brae in summer 2006 and 2007 did not reveal any emerging bats. Anabat surveys performed in 2007 recorded high levels of soprano and common pipistrelle bats along the Old Deeside Railway located at the south of this Habitat Area as per S31 indicating high quality of connectivity between the roosting habitat in this Habitat Area and foraging areas to the east and west along Deeside.
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 were not found to have significant 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 connectivity with adjacent HA's. 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, with possible brown long-eared droppings under a hole in the roofspace, although this was not confirmed by emergence survey. 2006 activity surveys on the southern edge along Culterhouse Road recorded four commuting and four foraging pipistrelles. The wood has strategic value as a foraging area due to its proximity to Peterculter and Milltimber roosting habitats, and a probable commuting route exists at Culter House Road as per S32.
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 having roost potential (2a), 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 garden by common and soprano pipistrelles. A probable Daubenton's bat was recorded passing over the shelterbelt on the western edge of this HA. The wood has strategic value as a foraging area due to its proximity to Peterculter and Milltimber roosting habitats.

Habitat Area	Feature	Feature Type	Description / Additional Information
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 HA, 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 may provide commuting habitat, 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, although only a single bat was recorded during both manual and AnaBat comuting route surveys in 2007, and if the tree line is used as a commuting route it is unlikely to be used frequently. Several stands of trees have been identified as having some to high roost potential although these exist on the edges of this HA. Day survey identified potential building roosts at Garden House and bungalows near the edge of the study area. Bats were 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.	HA contains predominantly conifer woodland and scrub with varying structure. 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 roost potential. The area includes two building roosts, one of which is an anecdotal historic roost at Beanshill House (landowner comments), the other is a small pipistrelle bat roost at Airy Park Cottage. Laggan Cottage was considered to contain features of potential use as roosts but no bats were recorded during emergence survey. One further building in this Habitat Area was found to have roost potential (2b). Activity, commuting and emergence surveys in 2006/2007 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. Anabat surveys performed in 2007 recorded relatively high levels of soprano and common pipistrelle bats along Contlaw road which crosses the centre of this HA.
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 provide potential 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 due to the presence of a small number of droppings in a garage, although the species has not been confirmed. Activity and commuting surveys within the area confirmed the presence of a commuting route between Contlaw Road and Beanshill, although only small numbers of bats were recorded using the feature and the scrub-lined track is in an exposed position. Soprano and common pipistrelles were recorded foraging around trees / gardens and hedges within the area and around the edges of S39, confirming the suitability of the foraging habitat despite its relative inaccesibility. A daytime survey in 2007 one building close to the edge of the study area was identified as having roost potential (2b).

Habitat Area	Feature	Feature Type	Description / Additional Information
S39	Beans Hill	Commuting and foraging habitat.	Acid grassland, dry heath and scattered gorse provide bats with shelter and foraging opportunities in this area. Wall–enclosed, sheep-grazed, improved grassland is dominant to the east with occasional trees and inherently low foraging and roosting potential . Beans Hill is relatively exposed and there is little shelter, which is likely to reduce habitat value to bats. Areas of woodland, scrub and gorse lined field boundaries were confirmed to provide foraging and commuting habitat for common and soprano pipistrelles and a commuting route leading from this Habitat Area exists as per S38. The Habitat Area provides a limited foraging resource and stepping stone between Milltimber and higher value habitats in Silverburn as per Section SL5. Daytime surveys in 2007 identified one building as having roost potential (2b).

Table 20 – Bat Activity Results for 2006 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.

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

Grid Reference	Habitat	Species	Number of Bat Passes	Activity[4]	Notes
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.
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.

Grid Reference	Habitat	Species	Number of Bat Passes	Activity[4]	Notes
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.
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.

Grid Reference	Habitat	Species	Number of Bat Passes	Activity[4]	Notes
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.
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.

Grid Reference	Habitat	Species	Number of Bat Passes	Activity[4]	Notes
NJ 847 010	Tree line, Culter Lodge	Common Pipistrelle	1	F	Tree line outside Culter Lodge on main track.
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.

Table 21 – Bat Activity Results for 2007 Section SL4

Name of Transect Area	Culter House Road and access road		Milltimber Junction		Contlaw Road		Airy Park Cottage		Track between Beanshill and Contlaw Road	
Survey Method	AnaBat	AnaBat	AnaBat	Manual	AnaBat	Manual	AnaBat	Manual	AnaBat	Manual
Date of survey	18/07/06 (Survey 1)	31/05/07 (Survey 2)	13/06/07	28/05/07.	24/07/07	12/06/07	28/05/07	06/07/06	25/05/07	06/07/06
First Bat	Unknown.	21.49	23.48	22.27	22.04	22.45	22.19	22.20	No bats recorded	22.17
Last Bat	Unknown	03.38	23.48	22.27	04.08	23.10	22.38	23.20		23.15
Total species	1	2+	1	1	2	1	2+	2		2
Total passes	4	24	1	1	62	5+	10	7		10
Total Soprano Pipistrelles	0	11	1	1	20	0	3	4		4
Total Common Pipistrelles	0	12	0	0	42	5+	6	3		6
Total Myotis Species	0	0	0	0	0	0	0	0		0
Total Any Pipistrelle Species	4	0	0	0	0	0	0	0		0
Total Unknown species	0	1	0	0	0	0	1	0		0

Name of Transect Area	Culter House Road and access road	Milltimber Junction	Contlaw Road	Airy Park Cottage	Track between Beanshill and Contlaw Road
Summary of information gathered at site	Few bats recorded in static bat survey survey 1. Moderate numbers of pipistrelle bats were recorded on the second survey despite chilly weather and drizzle. One or two bats foraging along Culter House Road. No bats observed commuting along shelterbelt, but one soprano pipistrelle bat recorded foraging. AnaBat data collected supports manual survey with low numbers recorded.	A single pipistrelle bat was recorded at this site with the AnaBat detectors; only a single bat was recorded in the manual survey, outside the study area foraging away from the potential commuting route. The route may only be used infrequently by bats.	No commuting recorded but foraging common pipistrelles recorded at the northern end of the road. AnaBat data shows presence of both soprano and common pipistrelles.	AnaBat and manual data collected shows relatively low number of pipistrelle bats use the area including commuting behaviour from south to north approximately 10 minutes after sunset.	No bats recorded during AnaBat surveys; small number of pipistrelle bats observed commuting rapidly west-east and east-west along the scrub lined track between Contlaw Road and Beanshill. High exposure levels noted; no foraging opportunities en route.

Section SL5

3.2.41 Section SL5 contains six HA's. 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.

3.2.42 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 HA's contain trees with high roost potential: within Gairnhill Wood, along the road edge north of Silver Burn House and in the woodland to the south of Gairnhill Wood.

3.2.43 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.

3.2.44 Acitivty surveys performed in 2006 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.

3.2.45 A total of 45+ bat passes were recorded during the 2007 manual commuting route surveys in this section. Of the passes 30+ were foraging bat passes from common and soprano pipistrelles and 14 bwere commuting bat passes from soprano pipistrelles, common pipistrelles. One social call was recorded from a common pipistrelle.

3.2.46 Static AnaBat SD1 CF Bat Detectors recorded bat passes from common and soprano pipistrelles bats between four commuting routes. At Silverburn Road 236 bat passes were recorded including 51 soprano pipistrelles and 184 common pipistrelles. At the Gairnhjll access road 103 bat passes were recorded including 99 soprano pipistrelles and 3 common pipistrelles. A farm track between Gairn Farm and Kingshill Wood recorded 15 bat passes including 8 soprano pipistrelles and 6 common pipistrelles and 1 Myotis bat. At the Auchlea Moss 8 bat passes were recorded including 4 soprano and 3 common pipistrelles.

3.2.47 The results from Section SL5 are shown in Table 22, Table 23 and Table 24 and in Figures 25.4e–g and 25.5e–g.

Table 22 – Specific Features within Section SL5

Habitat Area	Feature	Feature Type	Description / Additional Information
S40	Agricultural fields around Silver Burn	2 confirmed roosts, 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. Silverburn House was subject to an emergence survey in 2007 and was confirmed as an assumed maternity roost for soprano pipistrelles Due to the presence of large quantities of droppings beneath two roost entrances; the landowners regularly see and hear bats and three bats were observed entering and leaving the roost on the night of survey. Ard-na-Moine is also a confirmed bat roost where a single pipistrelle bat was observed entering the roofspace in 2007 surveys. Brown long-eared and common pipistrelle bat activity was also recorded in the area on the night of survey. An AnaBat commuting route survey performed in 2007 to the west of Silver Burn House recorded high levels of soprano and common pipistrelle bat activity. A further four buildings in this Habitat Area were identified as having potential for roosting; no trees with roost potential were recorded, During activity surveys in 2006 a number of bats were recorded foraging and commuting along the main road through Silver Burn as detailed in S41 and S42. 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 with low inherent potential for roosting, but 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 at Silver Burn 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 roost.	Improved/semi-improved grasslands with frequent areas of species poor marshy grassland at Rotten O'Gairn DWS provide excellent value foraging habitat which also includes mixed and wet woodland. One potential building roost was identified within this area, although no bats were recorded during emergence surveys. Silver Burn flows through a culvert with low roosting potential as per S40. Activity, commuting and emergence surveys confirm the high value habitat in this general region. Brown long-eared bats as well as common and soprano pipistrelles were recorded foraging and commuting in this sheltered area and along the road, which is subject to relatively low disturbance levels despite occasional traffic, 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 as per S41. The emergence survey at East Silver Burn in particular recorded a high level of foraging and commuting activity by common and soprano pipistrelles. An AnaBat survey performed along the road in 2007 to the north of Ard na Moine as per S40 recorded high levels of soprano and common pipistrelle bat activity.
S43	Gairnhill and Kingshill Wood	Foraging and commuting habitat, potential tree roosts.	Plantation conifer woods dominate with some beech and a strip of mature broadleaved woodland near Rotten O'Gairn (HAS42) which has high potential for roosting bats. 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 continuous connectivity between these features indicate its probable importance as a large-scale commuting corridor. The area is subject to relatively low levels of disturbance. Linear features such as woodland edges, tracks and rides provide commuting habitat of high potential 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. Activity surveys in 2006 and 2007 confirm the high value habitat as predominantly common and soprano pipistrelles were recorded commuting and foraging in the area and the majority of activity recorded in the

Habitat Area	Feature	Feature Type	Description / Additional Information
			western and southern parts of the area. Five brown long-eared bat foraging passes were recorded along the west side of Gairnhill Wood. Anabat surveys performed in 2007 recorded high levels of soprano and common pipistrelle bats along Silverburn road located to the west of this Habitat Area as per S40.
S44	Agricultural fields to the west of Kingshill Wood	Two roosts, further potential roosts, foraging, and commuting habitat, potential hibernaculum .	This area is dominated by improved and arable fields surrounding Moss of Auchlea (S45) and adjacent to Kingshill Wood (S43) and Rotten O'Gairn DWS (S42). Walls are dominant feature of the borders between fields with occasional gorse which have some potential for commuting. The area includes field drains / ditches with associated marshy habitat and associated insect prey resource west of Gairnlea in the south of this area. The southern part of the Habitat Area is generally more sheltered and offers high quality mosaic of habitat types ideal for foraging as per S41 and S42. The northern part of the Habitat Area is relatively exposed with few features offering shelter or foraging potential, and is bordered by the A944. The Habitat Area includes roosts identified during daytime surveys in 2006. The roost at Moss side of Auchlea was confirmed to support a small number of soprano pipistrelle bats due to the presence of a bat returning to the roost and exiting shortly afterward during emergence survey in autumn 2007, possibly indicating its potential as a winter roost. Back Hill of Brodiach had an emergence survey performed in 2007, but no roost was confirmed. This was despite anecdotal evidence of the presence of a roost; soprano pipistrelle bats were recorded foraging and social calling in a barn. A dead common pipistrelle bat was given to surveyors by the landowner at Craiglug in 2006 although no bats were recorded emerging during survey in 2007 and no signs of a roost were evident. Aonachrigh, adjacent to the potential roost at Craiglug, was found to house bats during the summer in 2007 due to the presence of many droppings on a window ledge, in the garage and on a small window ledge near the front door. The number of droppings and entrances would indicate that this is likely to be a maternity roost for pipistrelle bats, which may use alterative roosts nearby at different times of the year. 11 properties (some with multiple buildings) were identified as potential roosts during daytime surveys in 2006 and 2007. Data from activity, commuting and emergence surveys performed in 2006 indicates that the Habitat Area is well used by bats, particularly Habitat Area round 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. Most bats recorded were common and soprano pipistrelles, although brown long-eared bats were recorded foraging in the gardens of Gairn Farm near potential roost habitat in Gairnhill Wood as per S43. Data indicates that bats are using features to commute across the identified study area. Anabat surveys performed in 2007 recorded high levels of soprano pipistrelle bats and a few common pipistrelle and Myotis bats (presumed to be Daubenton's bats due to the presence of aquatic habitats nearby) along an access road to Gairn farm located in the southeast of this HA, and also at the access to Moss of Auchlea.
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.

Table 23 – Bat Activity Results for 2006 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+.
NJ 846 052	Silver Burn	Common Pipistrelle	1	C	Faint pass.

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

Grid Reference	Habitat / location	Species	Number of Bat Passes	Activity[5]	Notes
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.

Table 24 – Bat Activity Results for 2007 Section SL5

Name of Transect Area	Silverburn Road		Gairn Farm Access		Edge of Gairnhill Wood		Gairn Farm track		Access to Auchlea Moss		Smiddybrae	
Survey Method	AnaBat	Manual	AnaBat	Manual	Manual (1)	Manual (2)	AnaBat	Manual	AnaBat	Manual	AnaBat	Manual
Date of survey	24/07/07	11/06/07	12/07/07	11/06/07	17/07/06	11/06/07	24/07/07	25/07/07	24/07/07	14/06/07	12/07/07	14/06/07
First Bat	22.07	22.42	22.33	22.14	Not recorded	22.42	22.25	22.18	22.52	23.15	22.11	23.15
Last Bat	04.20	23.11	03.50	23.26	Not recorded	23.28	02.55	23.11	03.58	23.27	03.44	23.27
Total species	2	2	2	1	1	2	3	2	2	0	2	1
Total passes	236	8	103	17+	6	20	15	8	8	0	39	2
Total Soprano Pipistrelles	51	3	99	17+	0	9	8	1	4	0	29	0
Total Common Pipistrelles	184	5	3	0	0	11	6	7	3	0	10	2
Total Myotis Species	0	0	0	0	0	0	1	0	0	0	0	0
Total Any Pipistrelle Species	1	0	1	0	6	0	0	0	1	0	0	0
Total Unknown species	0	0	0	0	0	0	0	0	0	0	0	0
Summary of information gathered at site.	AnaBat survey shows high bat activity from soprano and common pipistrelles. Manual survey recorded fewer bats despite good conditions on survey night but confirmed the dominant species assemblage. Brown long-eared bat observed commuting along this road in 2006.		Soprano pipistrelles commuting and foraging in woodland and clearings along the whole of transect in the direction of the path.		Soprano and common pipistrelle bats foraging and commuting along roadside vegetation and along silver bridge burn. Moving in all directions north, south, east and west.		Common pipistrelles recorded and commuting across fields and foraging in trees towards farm barns. Social calls of soprano bats also recorded. AnaBat data collected supports the manual survey but also shows the presence of a Myotis species.		AnaBat survey shows a very low bat activity from soprano and common pipistrelles, confirmed by the manual survey.		Common pipistrelles were observed mainly foraging around trees and at Jameston cottage. Only one was recorded commuting through study area from south to north. AnaBat data collected supports the manual survey.	

Section SL6

3.2.48 Section SL6 includes 12 HA's (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 with relatively low inherent value to bats due to the absence of shelter. The fields are bordered by shelterbelts of mature mixed trees with 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 and evening emergence surveys revealed the presence of roosts, of which four are in buildings (the Coach House at Cloghill supports soprano pipistrelle bats in autumn; small number of bat droppings recorded at Fairley Home Farm; Derbeth Farm and Heywood were both reported to support roosts by their owners) and seven were identified in trees during 2004 surveys and are likely to support small numbers of Myotis, pipistrelle and brown long-eared bats on a temporary basis. All of these roosts 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.

3.2.49 Further potential building roosts and tree roosts were identified within this section in cracks and gaps.

3.2.50 Evening activity surveys revealed a 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 for small numbers of bats 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.

3.2.51 The total number of bat passes recorded within Section SL6 during the 2006 acitivity survey 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 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.

3.2.52 A total of 11 bat passes were recorded during the 2007 manual commuting route surveys in this section. Of the passes, only 1 was from a commuting bat, along an access track near Fairley House; the other were foraging calls from soprano and common pipistrelles.

3.2.53 Static AnaBat SD1 CF Bat Detectors recorded bat passes from common and soprano pipistrelles bats between two commuting routes. At Kingswell 10 bat passes were recorded including 3 soprano pipistrelles and 6 common pipistrelles. At Fairley House Farm 18 bat passes were recorded including 9 soprano pipistrelles and 9 common pipistrelles.

3.2.54 The results from Section SL6 are shown in Table 25, Table 26 and Table 27, and in Figures 25.4g–h and 25.5g–h.

Table 25 – 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.	Extensive area of small improved and semi-improved fields with gorse and shrub borders, offering generally low potential for foraging, roosting and commuting. A 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. An emergence survey was undertaken on 11th November 2006 and a single soprano pipistrelle bat flew out of the hole and foraged in the fields before returning to the roost. Given the timing of the survey it is possible that the building is used as a winter roost or hibernaculum. 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. 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 (HAS47). Brown long-eared bats were observed along an access track during 2004 bat activity surveys.
S47	West Hatton Wood DWS	Foraging area and potential commuting route and potential tree roosts.	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. 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) Brown long-eared bats observed foraging near the woodland (2004 bat activity surveys).
S48	Cloghill	Potential foraging and commuting habitat.	HA 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. No bats were recorded during activity surveys in 2004 or 2006.
N1	Kingswells	Potential roosts, foraging and commuting habitat.	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 and although the area was not surveyed (see Section 2.6) the number of buildings with suitable roost habitat is expected to support county significant numbers of bats, and is likely to include pipistrelle bats, Daubenton's and brown long-eared bats. Pipistrelle bat commuting routes identified in 2004 and 2006 bat activity surveys lead from Kingswells to foraging areas to the west (N4). Commuting route surveys undertaken in 2007 using AnaBat and manual techniques identified a small number of pipistrelle bats foraging around the edges of the main road along the outside of Kinswells. However no bats were observed flying across the road from presumed roosts in the houses in Kingswells to foraging activity to the west at Fairley, Brimmond and Derbeth.
N2	Agricultural fields north of Cloghill	Foraging and commuting habitat, potential roosts.	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. Soprano pipistrelle bats were recorded along Borrowstone Burn and nearby treelines, a Daubenton's bat was recorded foraging over the 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).

Habitat Area	Feature	Feature Type	Description / Additional Information
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 although this was not confirmed by daytime survey. Grandview has been identified as a potential roost (2b) and 2007 surveys identified another building as a potential roost (2b). Foraging pipistrelle bats were recorded in the area during 2004 and 2006 surveys.
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 as per N1. 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 in 2006 identified a bat roost in the house at Fairley Home Farm (category 1b) as indicated by the presence of droppings under the eaves. The species was not identified and subsequent emergence surveys in autumn 2007 were inconclusive although soprano pipistrelles were recorded foraging nearby. The farm buildings have also been identified as having roost potential (category 2a)/2b). Daytime surveys iIn 2007 identified one building survey as having roost potential (2b). A roost for unknown *Myotis* 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). Small 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. Manual and AnaBat commuting route surveys undertaken in 2007 revealed pipistrelle bats commuting along the access roads through the Habitat Area demonstrating connectivity between roosting and foraging habitat in the wider context as per N7.
N6	Woodland west of Hillhead of Derbeth Farm.	Foraging and commuting area, potential roosting.	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 House/Fairley Home Farm as per N4/N7.

Habitat Area	Feature	Feature Type	Description / Additional Information
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 ad commuting bats and generally low potential for roosting. Bat droppings (species unknown) identified in a tree near Dykeside (NJ 864 087) and anecdotal evidence of a bat roost from landowner consultation was recorded at Heywood, although bats had not been recorded for a couple of years. 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). Manual and AnaBat commuting route surveys undertaken in 2007 revealed pipistrelle bats commuting along the access roads through the Habitat Area demonstrating connectivity between roosting and foraging habitat in the wider context.
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 26 – Bat Activity Results for 2006 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.

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

Grid Reference	Habitat	Species	Number of Bat Passes	Activity[6]	Notes
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.
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.

Table 27 – Bat Activity Results for 2007 Section SL6

Name of Transect Area	Kingswells		Fairley House Access Track	
Survey Method	AnaBat	Manual	AnaBat	Manual
Date of survey	12/07/07	20/06/07	31/05/07	13/07/07
First Bat	22.42	22.45	22.19	22:24
Last Bat	03.32	23.15	00.43	22:30
Total species	2+	1	2	2
Total passes	10	4	18	7
Total Soprano Pipistrelles	3	4	9	4
Total Common Pipistrelles	6	0	9	2
Total Myotis Species	0	0	0	0
Total Any Pipistrelle Species	0	0	0	3
Total Unknown species	1	0	0	0
Summary of information gathered at site	Soprano pipistrelles recorded foraging along the edge of the road which passes road the west of Kingswells. No commuting behaviour was recorded. AnaBat data supports the results from the manual survey with low numbers of pipistrelle bats recorded. It is possible that bats roosting in the houses in Kingswells may fly across the road to forage along broadleaved shelterbelts around Cloghill and Derbeth.		Some commuting and foraging pipistrelle bats were observed over 30 minutes after sunset. The initial bat was commuting from the east (possibly form roosts in Fairley house or Kingswells). All bats were using the trees and shelter along the track leading to Fairley Home Farm and fields north of the farm.	

3.3 Survey Results Summary

3.3.1 A number of features of value to bats have been identified within the 54 HA's 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 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 Several 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, Ard-na-moine, Silver Burn House, Ardcholie, Moss-side of Auchlea and the Coach House at Cloghill. All had emergence surveys carried out and roosts identified.

3.3.5 A number of properties were identified as bat roosts based on signs identified during day surveys or anecdotal evidence. These include the garage at the house to the south of Mains of Charleston,

Causeyport Cottage, Red Tile Lodge, cottage at Eastland Bridge, restaurant at Story Book Glen, The Old Mill Inn, Witiko in Camphill, Culter Lodge, West Lodge, Beanshill Steading, an outbuilding at Backhill of Brodiack Farm, Fairley Home Farm Steading, Derbeth Farm, Heywood, Newton Farm, Airy Park Cottage and Beanshill House. No bats were seen emerging from any of these buildings during the evening surveys which were carried out. 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.

3.3.6 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.

3.3.7 Four culverts have been identified as having medium potential for roosting and numerous sites have been identified as having trees with roost potential.

3.3.8 A total of 1993+ bat passes were recorded during the 2006 activity surveys. 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.

3.3.9 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.

3.3.10 A total of 281+ bat passes were recorded during the 2006 manual activity surveys. Of these passes 195+ were foraging bat passes, 88 were commuting bat passes and 3 were social calls. Sections SL3 and SL4 of the study of the study area contain the highest concentration of bat activity and the lowest was in Section SL1. Areas of activity were concentrated at the access area to Auchlea Moss, along the Old Deeside Railway, South Deeside road and Silverburn road.

3.3.11 A total of 2545 bat passes were recorded using the AnaBats SD1. Of these passes 1031+ were soprano pipistrelles, 825+ were common pipistrelles and 11 were Myotis bats.

3.3.12 The manual transect surveys illustrate Bat activity was concentrated around certain features:Merchant's Croft (28+ passes), the Old Deeside Railway Line (30+ passes) and Kingcausie (28 passes). Features of concentrated bat activity shown by the AnaBat transect surveys include the access area to Auchlea Moss (320 passes), Bishopton (185 passes), Blaikiewell (175 passes), Burnhead (120 passes), Merchant's Croft (63 passes), South Deeside Road (285 passes), the road to Milltimber (106 passes), the Old Deeside Railway (207 passes), Contlaw Road (62 passes), Silverburn Road (236 passes) and Gairnhill Access (103 passes).

3.3.13 In 2006 commuting routes were identified where bat activity was observed connecting HA's and along linear features. These include the access road to Sunnyside Steading, the road adjacent to Whitestone, Blaikiewell Burn, the length of Crynoch Burn, the north entrance driveway into Kingcausie, the River Dee, the B979 from Milltimber to the River Dee and North Deeside Road. Other commuting bats were recorded in smaller numbers along tree lines and other linear features throughout the study area.

3.3.14 In 2007 identified commuting routes where bat activity was observed connecting HA's, along linear features includ

3.3.15 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 HA's around Milltimber, the River Dee and Kingcausie recorded the largest range of species present in the study area. A possible incidental report of two potential Leisler's bats was made towards the end of the survey season (July 2006) at Rumlins Fauld, a farm steading within Kingcausie. Current evidence, including previous records of Leisler's bat in Aberdeenshire show uncertainty about the size of the population in Aberdeen and its rarity in Scotland, particularly this far north..

3.3.16 Potential commuting routes were identified in 2006 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.

3.3.17 Potential commuting routes were identified in 2007 along Causey Mounth Road, by Clochandighter, North of Clochandighter, Merchants Croft, Burnhead, Blakiewell Burn, Kingcausie, the road to Milltimber, the Old Deeside Railway, Silverburn road, Gairnhill, Fairley Houses and Gairn Farm.

3.3.18 All identified habitats of potential high value to foraging bats were surveyed during night-time activity surveys.

3.3.19 Daytime habitat assessment and evening emergence surveys revealed over 30 roosts including maternity 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.

3.3.20 Five 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 behaviours 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.

3.3.21 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. Each Habitat Area has been evaluated separately, but it should be noted that bats are highly mobile and that they may travel many kilometres in a night between roosts and foraging areas. Different species and different groups within each species are likely to overlap. As such, the value of each Habitat Area for bats is likely to have been assessed as being lower than the value of all the habitats in the section combined.

4.1.2 The proposed scheme runs predominantly through agricultural land managed for pasture and arable farming. Many of the woodlands within the survey area are coniferous plantation, which is considered to be of low inherent value to bats. Entwhistle et al (2001) note that whilst they do not provide good roosting opportunities, some coniferous woodland can provide high insect abundance and foraging habitat for species including pipistrelles and brown long-eared bats. However, there are other areas of suitable habitat including broadleaved woodland, tree lines and water features which are important because of their inherent value for bats seeking insect prey or roost sites, including Daubenton's bats and Natterer's bats. They are also important at a greater spatial scale due to their position and interconnection with habitats in the wider landscape including those in the Fastlink of the proposed scheme (see part 2 of this report).

Section SL1

4.1.3 Of the ten Habitat Areas identified within Section SL1, four have been assessed as being of county importance due to the presence of small roosts for locally important species (pipistrelle bats) and because the habitats and features (including commuting routes and foraging areas) they provide are considered to enrich the habitat provision at above local level.

4.1.4 The remaining Habitat Areas have all been assessed as being of local value to bats on account of the presence of commuting and foraging habitat andpotential roosts considered to enrich the local habitat resource and to support locally significant numbers of locally important bat species. 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. The best areas of shelter and foraging habitat including woodland, wet habitats and scrub are generally small, patchy and fragmented. However, they have combined importance in supporting local bat populations, including those populations which roost and forage outwith the study area.

4.1.5 The evaluation of Habitat Areas in Section SL1 is shown in Table 28.

Table 28 – Evaluation of Habitat Areas in Section SL1

Habitat Area	Actual Activity[7]	Potential activity[7]	Evaluation	Comments
S1	Not surveyed	F,C	Local	Small area of woodland provides an area of foraging habitat and part of a potential commuting route. It is considered to appreciably enrich the local habitat resource.
S2	2R, F, C	R	County	The two roosts at Charleston Mains and Lochview Croft are not considered to be maternity roosts due to the small number of bats/droppings recorded using them. Roosts and habitats including commuting routes to Loirston Loch considered to support county significant populations of roosting pipistrelle bats, enhancing the habitat resource to county level.
S3	F observed; not formally surveyed	C	Local	Foraging habitat supports locally significant number of pipistrelle bats and mosaic of habitat types enhance local habitat resource providing edge and wet foraging habitat and potential commuting habitat.
S4	Not surveyed	F	Local	Foraging habitat supports locally significant number of pipistrelle bats and mosaic of habitat types enhance local habitat resource providing wet foraging habitat.
S5	C,F	R	Local	Area provides connectivity between adjacent HA's of higher value and supports locally significant numbers of pipistrelle bats.
S6	F, C	R	Local	Area includes ponds / marsh / wet grassland and linear habitats and potential building roosts considered to enhance the local habitat resource. Area provides connectivity between adjacent HA's of higher value and supports locally significant numbers of pipistrelle bats.
S7	n/a	C,F	Local	Woodland borders provide potential commuting habitat of medium value and potential foraging habitat considered to enrich the local habitat resource.
S8	1R, C, F	R	County	Bat roost at Causeyport not likely to support maternity roost due to absence of signs and landowner comments but building and associated commuting route and foraging habitats considered to enhance county habitat resource.
S9	C, F	R	County	Commuting route along Causeyport Road is considered to enrich the county habitat resource, providing pipistrelle bats with opportunity to fly between foraging and roosting habitat north and south of the scheme.
S10	Not surveyed	C,F	County	Hare Moss and associated wet woodland and sheltered riparian habitats provides excellent quality foraging habitat in area of otherwise exposed farmland and is considered to enrich the habitat resource at greater than local level.

Section SL2

4.1.6 Of the six Habitat Areas in this section, three have been assessed as being of county importance to bats. Although no roosts were recorded in this section, the woodland, linear habitats and foraging areas within it are considered to be important strategically. This is due to their position close to larger areas of habitat including Kingcausie to the northwest, Shanna Burn Wood and a roost to the northeast, as well as providing connecting features along commuting routes. Three of the Habitat Areas were assessed as supporting locally significant populations of pipistrelle and brown long-eared bats.

4.1.7 The eastern parts of 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 foraging and commuting around the patches especially in the west of the section confirm its value in supporting populations of bats, and

[7] R=Roost, C= Commuting, F=Foraging

in providing stepping stones between alternative areas of resource outwith the study area, including Clochandighter Wood, Shanna Burn Wood and Kingcausie.

4.1.8 The evaluation of HA's in Section SL2 is shown in Table 29.

Table 29 – Evaluation of Habitat Areas in Section SL2

Habitat Area	Actual Activity[8]	Potential activity[8]	Evaluation	Comments
S11	F,C	n/a	Local	Woodland area considered to enrich the local habitat resource, providing broadleaved woodland and associated insect prey and shelter along side a commuting route and supports locally significant number of pipistrelle bats.
S12	F,C	n/a	Local	Birch and broadleaved woodland and pools, burns and channels considered to enrich the local foraging habitat resource and commuting route and habitats support locally significant numbers of pipistrelle bats.
S13	F,C	R	County	HA includes three commuting routes connecting foraging and roosting habitat including Clochandighter, Hill of Blairs, Auchlunies and Hare Moss, and considered to enrich the habitat resource at above local level. Area supports locally significant populations of pipistrelle and brown long-eared bats
S14	F	C.	Local	Conifer woodland provides limited shelter and foraging opportunities although the area connects important areas of bat habitat and supports locally significant numbers of common and soprano bats which enrich the local biodiversity resource.
S15	F,C	R	County	Whitestone Wood and Hill of Blairs provide pipistrelle and possibly Daubenton's bats with mosaic of foraging habitats such as woodland, waterbodies, scrub, heath and bog which are connected to larger area of valuable bat habitat including roosts in Kingcausie (as per SL3) and is considered to enrich the biodiversity resource at above local level.
S16	F,C	R	County	Commuting routes along hedges, walls and scrub lined tracks which go through this area and connect larger HA's to the north and south of the scheme support locally significant populations of pipistrelle bats. These and mosaic of foraging habitats are considered to enhance the habitat resource at above local level, especially given proximity to roosting and foraging habitat in Kingcausie as per SL3.

Section SL3

4.1.9 Of the 15 HA's in Section SL3 five (three in Kingcausie and associated habitats, one at the River Dee and banks and one at Camphill) have been assessed as being of Regional importance primarily due to the numbers of bats supported and the range of species present.. The evaluations also reflect the presence of maternity roosts and autumn roosts with potential as hibernacula which maintain county significant bat populations at vulnerable times of the year, as well as the quality and size of the broadleaved and semi natural habitats these HA's contain.

4.1.10 Five HA's were assessed as being of County importance as the habitats they provide and the complement of bat species they support are considered to enrich the biodiversity at above local level. Four HA's were considered to be of local importance, supporting locally significant numbers of common bat species and not considered vital in maintaining these populations. One Habitat Area was assessed at less than local level due to the limited ecological potential of the habitats found there.

4.1.11 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

[8] R=Roost, C= Commuting, F=Foraging

habitat which is subject to very low levels of disturbance. Kingcausie includes some of the best examples of ideal bat habitat in the whole of the AWPR 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 and brown long-eared, 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 maternity roosts for Daubenton's bats of national significance (Rydell, undated).

4.1.12 The evaluation of HA's in Section SL3 is shown in Table 30.

Table 30 – Evaluation of Habitat Areas in Section SL3

Habitat Area	Actual Activity[9]	Potential Activity[9]	Evaluation	Comments
S17	1R,F,C	R	County	This area includes one confirmed roost at Red Tile Lodge which supports a county significant population of pipistrelle bats. The commuting route between Kingcausie and features to the south also supports foraging and commuting pipistrelle and Myotis bats connecting the estate with linear features leading south to foraging areas and is considered to enrich the resource at county level.
S18	F,C	n/a	Local	Durris Forest provides some potential for foraging and commuting bats but due to habitat type is not considered to enrich the resource at above local level.
S19	F	C.	Local	Blaikiewell farm and edges provide foraging habitat for a locally population of pipistrelle bats but is not considered to enrich the resource at above local level.
S20	R, F,C	R	County	A tree roost supports a locally significant number of bats and adjacent trees also have suitable cavities and gaps. The wood forms part of a wider area of strategic value to bats along a green corridor which also includes the River Dee and Kingcausie and is considered to enrich the county habitat resource.
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 higher value to the east.
S22	2R,F,C	R,F,C.	Regional	The roosts at Eastland Bridge and Storybook are likely to maintain bats and it is likely that the area supports maternity and hibernation colonies of bats at sensitive times of year. Crynoch Burn and Blaikiewell Burn form excellent linear routes and foraging and roosting habitat of high value suitable for all the species and is considered to extend the habitat resource provided by Kingcausie and the River Dee at above County level.
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 HA's, as well as providing high value foraging and roosting habitat. The area includes two confirmed roosts, at Eastland House and Cottage, which maintain breeding colonies of bats at a vulnerable stage in their annual cycle. 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.	Regional	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 HA's, as well as providing high value foraging and roosting habitat for the full complement of bat species

[9] R=Roost, C= Commuting, F=Foraging

Habitat Area	Actual Activity[9]	Potential Activity[9]	Evaluation	Comments
				found regularly in Aberdeen (two pipistrelle species, Natterer's, Daubenton's and brown long-eared bats). The Habitat Area includes two confirmed roosts for species including brown long-eared bats at Rumlins Fauld and pipistrelle bats at the Coach House both of which are likely to maintain maternity colonies. A tree roost was identified adjacent to the Coach House and several other buildings and trees on the estate have roosting potential, including a well-house suitable as a hibernaculum.
S25	R (historic, anecdotal) F, C	F,C.	Local	Rosst at Old Mill Inn not likely to be re-established due to loss of original roost characteristics. Commuting and foraging habitat supports locally significant numbers of pipistrelle and Daubenton's bats.
S26	F,C	R	Local	Fields adjacent to the Dee support locally significant numbers of pipistrelle and Daubenton's bats and are not considered to enrich the foraging, rosting or commuting habitat at above local level.
S27	F,C	R	County	The South Deeside Road and banks of the River Dee support county significant populations of commuting bats and provide connectivity between HA's along a green corridor.
S28	F, C	n/a	Regional	The River Dee and its banks and in-channel islands provides high value commuting, foraging and roosting 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) exists and although there is no further evidence to suggest that there is a population of Leisler's bats still in the area the record does imply the high habitat value of the site.
S29	F, C	R,F,C.	County	Commuting route between Milltimber and the River Dee represents a feature of above local importance to local pipistrelle and Daubenton's bat populations.
S30	2R (one confirmed and one anecdotal), F , C	R,F,C.	Regional	Camphill and associated buildings and broadleaved woodland support two roosts including a confirmed pipistrelle roost (presumed to be a maternity roost) and an unconfirmed roost, as well as several potential building roosts. 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 and are considered to be of regional value to pipistrelle bats.
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 bat habitats over several kilometres, including roosting areas Bieldside and Milltimber, and foraging areas at the River Dee.

Section SL4

4.1.13 Of the eight HA's identified in Section SL4 two have been evaluated as being of regional importance to bats, largely due to the presence of roosts, including a probable maternity roost and possible winter roost for brown long-eared bats and pipistrelle in the older parts of the International School buildings. The number of roosts represented in this section reflects the importance of built up areas such as Milltimber for bats, especially given their strategic location along Royal Deeside and close to the River Dee and associated riparian and woodland habitats which represents a regionally significant foraging and commuting habitat resource as per Section SL3, and which provides connectivity with resources up-and downstream.

4.1.14 Four of the HA's in this section were assessed as being of county importance to bats as they support roosting bats and expand the foraging and roosting habitat resource offered by the larger

scale roosting area of Milltimber. The varied, wooded and linear habitats they provide are considered to enrich the habitat resource at above local level by providing stepping stones between higher value areas and green corridors along Deeside (as per Section SL3) and at Silverburn (as per Section SL5).

4.1.15 Two HA's were assessed as being of local importance, supporting locally significant numbers of relatively common bat species (pipistrelle bats) and providing some connectivity facilities between adjacent areas of key bat habitat.

4.1.16 The evaluation of HA's in Section SL4 is shown in Table 31.

Table 31 – 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 three roosts identified in surveys at Culter Lodge, West Lodge and a mixed species roost for brown long-eared bats and pipistrelles which is likely to be a maternity roost for these species and may also be used in the winter at the International School. Recorded roosts as supplied by the Aberdeen Bat Group, and potential building and tree roosts also exist elsewhere in Milltimber. 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 (Old Deeside Line) mean this area is evaluated as being of regional importance.
S33	F,R,C	R	Regional	The area includes recorded roosts in Milltimber and 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. This HA, in combination with S32, is considered likely to support regionally significant populations of bats including nursery colonies and hibernating bats.
S34	R, F,C	F,R,C	County	The area includes one brown long-eared roost at Bloomfield adjacent to Guttrie Hill Wood, and a number of potential tree roosts. The area includes commuting and foraging habitat and is located strategically close to Milltimber and Peterculter which are likely to contain a number of roosts. The woodland areas are considered, in combination with Milltimber Wood, to enrich the habitat resource at above local level.
S35	F,C.	R	County	HA includes commuting and foraging habitat, as well as potential tree and building roosts and supports populations of pipistrelle bats considered to extend the habitat resource provided by Guttrie Hill Wood and enrich the habitat resource at above local level by providing extensive foraging opportunities close to roosting habitat in Milltimber.
S36	F, C	R	Local	This area includes shelterbelt habitat with commuting potential and supports small numbers of foraging bats considered to enrich the local biodiversity resource.
S37	2R, F,C	R	County	Area includes two building roosts at Airy Park Cottage and Beanshill House with undetermined roost sizes although they are not considered to be maternity or hibernation roosts. Habitat Area proides probable commuting route along Contlaw Road, and foraging habitat the combined value of which are considered to be of above local importance to local bat populations.

[10] R=Roosts, C=Commuting, F=Foraging

Habitat Area	Actual Activity[10]	Potential activity[10]	Evaluation	Comments
S38	1R,F,C	R	County	The roost at Upper Beanshill identified on day survey is likely to support a small roost of a common species of bat. The roost and surrounding features including a commuting route of strategic importance to bats as a stepping stone between roosting areas in Milltimber and foraging areas at Silverburn, are considered to enrich the county habitat resource.
S39	F,C	n/a	Local	Area includes commuting and foraging habitat and supports locally significant number of pipistrelle bats, and the woodland at Beanshill and commuting route are considered to enrich the habitat resource at local level.

Section SL5

4.1.17 Two of the six HA's within Section SL5 have been identified as being of regional importance to bats on account of the presence of maternity roosts and potentially winter roosts. The remaining four HA's have all been evaluated as being of county importance as they include smaller roosts and/or support commuting and foraging bats and are considered to enrich the resource provision at above local level. This section extends an important green corridor that covers a wide area from Murtle Den north to Kingshill and Gairnhill Woods and provides connectivity between 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.

4.1.18 The evaluation of HA's in Section SL5 is shown in Table 32.

Table 32 – Evaluation of Habitat Areas in Section SL5

Habitat Area	Actual Activity[11]	Potential activity[11]	Evaluation	Comments
S40	2R, F, C	R	Regional	The area includes a pipistrelle roost at Silverburn House, maintaining a maternity roost of soprano pipistrelle bats during a sensitive time of the year, and a smaller pipistrelle roost at Ard-na-Moine. The roosts and the foraging and commuting features in this Habitat Area extend the habitat provided in adjacent HA's along a green corridor.
S41	F, C	R	County	Woodland contains high value commuting and foraging habitat, as well as potential tree roosts, and supports populations of pipistrelle bats – including those which roost at Silverburn House (S40). The habitats are considered to enrich the county habitat resource along a green corridor.
S42	F, C	R, F, C	County	Area includes potential roosts and valuable sheltered foraging habitat along a strategic commuting route and green corridor including pipistrelle bat roosts as per S40. Area extends the resource at Silverburn, Kingshill and Gairnhill Woods and is considered to enrich the county habitat resource.
S43	F, C.	R	County	Kingshill and Gairnhill Woods support populations of commuting and foraging pipistrelle and brown long-eared bats and potentially tree roosts. The area forms part of a larger Habitat Area that includes Murtle Den to the east and the Moss of Auchlea, enriching the county habitat resource described elsewhere in the section.
S44	3R (1 anecdotal), F, C	R, F, C, H	Regional	The area includes a potential winter roost at Moss of Auchlea, a probable maternity roost at Aonachrigh and an anecdotal roost at Backhill of Brodiach. These roosts are likely to be of strategic significance given their position on the green corridor described which includes the Moss of Auchlea and Kingshill Wood.

[11] R=Roosts, F=Foraging, C=Commuting

Habitat Area	Actual Activity[11]	Potential activity[11]	Evaluation	Comments
S45	F,C	n/a	County	The Moss of Auchlea provides excellent foraging habitat in undisturbed setting in an otherwise low value area of agricultural land, and supports a population of pipistrelle bats that roost at adjacent Moss Side of Auchlea.

Section SL6

4.1.19 Of the 12 HA's identified within Section SL6, one is considered to be of regional importance as it maintains a population of pipistrelle bats, potentially over the winter during hibernation when bats are vulnerable. Five HA's have been evaluated at County level as the resource which they provide, which includes many small roosts in buildings and trees (none of which are thought to maintain maternity colonies of bats due to the absence of indicative signs), shelterbelts, ponds and woodland areas (including West hatton Woods and woodland west of Derbeth Farm), enrich the otherwise low value agricultural land at above local level. The combined presence of these features, and an unknown number of roosts in Kingswells itself are likely to support county significant populations of pipistrelle, brown long-eared and Daubenton's bats, as confirmed by bat activity surveys over three survey periods (2004, 2006 and 2007).

4.1.20 Four HA's are evaluated as being of local importance as they support locally significant numbers of common bat species and their habitats appreciably enrich the local resource. Two HA's 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.

4.1.21 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 not threatened or rare in the region.

4.1.22 The evaluation of HA's in Section SL6 is shown in Table 33.

Table 33 – Evaluation of Habitat Areas in Section SL6

Habitat Area	Actual Activity[12]	Potential Activity[12]	Evaluation	Comments
S46	R, F, C	R, H	Regional	The roost at the Coach House maintains a population of pipistrelle species, potentially during hibernation when bats are at their most vulnerable and when optimal roost conditions are scarce. The roost may be used by bats which roost and forage in Kingswells.
S47	F, C	R	County	West Hatton Woods support populations of pipistrelle and brown long-eared bats and the semi natural broadleaved woodland habitat is considered to enrich the biodiversity research at above local level. The woods are strategically located close to a known bat roost at Home Farm identified during 2004 surveys and from Aberdeen Bat Group (pers. Comm. Isobel Davidson, Aberdeen Bat Group).
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	Roosting and foraging habitat provided in the estate is considered to enrich the county habitat resource by providing numerous roosting opportunities strategically located in commuting distance of foraging habitat to the west of the existing road.
N2	F, C	R	Local	Borrowstone Burn and pond support small populations of Daubenton's and soprano pipistrelle bats and the farm access track is a commuting and foraging route for species including common pipistrelles. and is considered to enrich the local habitat resource by connecting the higher value features and habitats in the section.

[12] R=Roosts, F=Foraging, C=Commuting

Habitat Area	Actual Activity[12]	Potential Activity[12]	Evaluation	Comments
N3	R, F	R	County	Derbeth Farm provides conditions suitable to support roosting bats and is likely to maintain a small population of a common species of bat. The roost and surrounding wooded habitats are considered to enrich the habitat resource at above local level.
N4	7 R, F, C	R, F, C	County	The presence of six tree roosts and a building roost at Fairley Home Farm supporting small populations of Myotis bats, brown long-eared and pipistrelle bats indicate the value of the habitats in this Habitat Area for providing roost opportunities and shelter for bats which are likely to roost and forage widely in the area. They are considered to enrich the biodiversity resource at above local level.
N6	F, C	R	Local	Site supports locally significant number of pipistrelle bats and habitats considered to enrich the roost and foraging habitat resource at local level
N7	2R, C, F	n/a	County	Tree roost and building roost maintain small populations of bats and the commuting route at Fairley House is considered to be of strategic value to bats roosting and commuting in the vicinity, enriching the habitat resource at above local level.
N8	F	n/a	Local	The slopes of Brimmond Hill provide some shelter exploited by foraging pipistrelle bats and are considered to extend the habitat resource provided elsewhere in the section, enriching the biodiversity resource at local level.
N9	None recorded	F	Less than local	Brimmond Hill 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

4.1.23 Overall, three HA's were considered to be of less than local, one of local, 33 of county, 18 of regional and two have the potential to support nationally significant populations of Leisler's bats by virtue of their important foraging habitats and commuting routes connecting HA's across the region and potential sightings in the area. 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. All of the HA's considered to be of regional value contain bat roosts which support or potentially maintain bat populations during sensitive and vulnerable times of the year (when nursing young or hibernating) and an abundance of potential tree and building roosts, which maintain populations of internationally important species. Most habitats within the study area with the potential to support foraging or commuting bats were observed being used by bats during evening surveys which indicates the presence of a network of roosting and foraging areas which are used by healthy populations of bat species throughout the Southern Leg. Where the numbers of bats were lower and the size, quality and context of resources they contain are smaller HA's have been assessed accordingly. The two areas of less than local importance to bats were considered to lack any significant resources suitable for roosting, foraging or commuting.

4.1.24 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) although this is partly a reflection of the level of survey effort here. 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.

4.1.25 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 ideal for commuting over large areas and the mosaic of habitat types makes for ideal foraging. 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.

4.1.26 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 (Highways Agency, 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 The significance of potential impacts on bat populations that would occur as a result of the proposed scheme varies in magnitude, 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 in relation to their relative contribution to the habitat resource.

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 Impact Assessment, of the AWPR ES 2007).

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 (Highways Agency 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 (Highways Agency, 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

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 form 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.

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 HA's where flight lines would not be directly severed but the road passes between HA's, 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, persl 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 (Highways Agency, 2001). Bats' colonial habits and dependence on buildings and 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 cause modifications to the channel bed morphology and water turbidity, and mitigation is therefore proposed as per Water Environment and Freshwater Ecology reports in Chapter 24 and Appendix A25.9 of the AWPR Environmental Statement 2007, respectively. In the absence of mitigation such fuch 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 respectively) and are therefore not covered in detail in this report.

5.2.25 The introduction of dust and particulate matter (PM_{10}) 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 low overall value of roosting habitat to be removed during construction.

5.3.2 Habitat loss is unlikely to be a significant issue throughout this section due to the generally low value of the agricultural and forestry habitats found there. However the loss of a quarry pond in Greenhowe Wood would be expected to result in an impact of high negative magnitude and Minor significance, Loss of forest rides and associated edge habitat in the wood would result in impacts of low negative magnitude and Minor significance, and the loss of the southern edge of Hare Moss bog and marshy grassland habitats would be expected to result in an impact of medium negative magnitude and Moderate significance due to loss of foraging habitat.

5.3.3 Fragmentation and severance would be predicted to be an issue at the road to the east of Greenhowe Woods and in the forest rides themselves which may be used as commuting routes through the woodland. These are predicted to result in an impact of medium negative magnitude and Minor significance on the small local population of bats which uses these habitats. The severance of Causey Mounth Road during construction would be predicted to result in an impact of medium negative magnitude and Moderate significance on bats.

5.3.4 Some disturbance due to construction noise and vibration and alteration to roost entrances and local commuting routes may occur at Charlestown where bat roosts at Lochview Croft and Mains of Charleston exist close to the proposed scheme, resulting in impacts of medium negative magnitude and Moderate significance. Disturbance of foraging and commuting bats would be an issue if night works were carried out near the higher value foraging and commuting habitats in the east of Greenhowe Wood (a predicted impact of medium negaqtive magnitude and Minor significance), in Greenhowe itself (predicted impact of low negative magnitude and Minor significance), along Causey Maunth Road commuting route (predicted impact of medium negative magnitude and Moderate significance) and at Hare Moss (precicted impacts of medium negative magnitude and Minor significance). Pollution may be an issue in the far east of the scheme where downstream impacts on Loirston Loch may affect foraging suitability, and at Hare Moss where the delicate water balance is important for maintaining the habitat types there. In the absence of mitigation, these would be predicted to result in impacts of medium negative magnitude and Moderate significance on the local bat populations.

5.3.5 During the operation of the road, direct mortality would be predicted to occur where the scheme crosses a potential commuting route at the woods to the west of the A90 (S3) with impacts of low negative magnitude and Minor significance on the small local population of bats. Although relatively small numbers of bats would be impacted, severance of the commuting route at Causey Maunth Road and this impact is predicted as being of medium negative magnitude and Moderate significance.

5.3.6 Habitat loss would be an issue (as per construction) where the pond in Greenhowe Wood is to be lost with a predicted impact of high negative magnitude and Minor significance on bats if alternative aquatic foraging provision is not made. The loss of forest rides and sheltered foraging habitat in Greenhowe Wood due to fragmentation by the road would result in an impact of only low negative magnitude and Minor significance on the small number of bats found there. Permanent loss of the southern edge of Hare Moss and potential alteration of the suitability of the Moss for foraging, if the water regime changes as a result of the operation of the road, may result in an impact of medium negative magnitude and Moderate significance on the bats that forage there.

5.3.7 Disturbance during the operation of the scheme is unlikely to be an issue at Charlestown as the operational road would not significantly alter the amount of disturbance from lighting to the roosts found there. However, foraging and commuting bats may be affected by noise and lighting in the currently undisturbed woodland and scrub area to the east of Greenhowe, in Greenhowe Wood itself, along Causey Maunth Road and at Hare Moss.

5.3.8 Pollution due to spills and polluted runoff from the road is most likely to affect the water quality and the insect availability of Loirston Loch and Hare Moss; impacts on the county significant resources found at these features would be predicted to result in impacts of medium negative magnitude and Moderate significance.

5.3.9 The potential impacts of the proposed scheme on bat populations in Section SL1 are shown in Table 34 below.

Table 34 – Assessment of Potential Impacts Section SL1

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
S1 Hatton Wood	Local	450 – 500m	Construction / Operation	No direct impacts predicted due to distance from scheme.	Negligible	Negligible
S2 Agricultural fields east of the A90	County	0 – 500m	Construction / Operation	No direct mortality predicted due to absence of roosts under alignment.	Negligible	Negligible
				No loss of bat habitat due to scheme passing through low value farmland.	Negligible	Negligible
				A90 works would not be expected to change existing levels of fragmentation between roosts in the east and foraging in the west.	Negligible	Negligible
				Disturbance possible during construction due to proximity of roosts to proposed scheme if works compounds are located nearby; no change to existing conditions expected during operation.	Medium Negative (construction); Negligible (operation)	Moderate (construction), Negligible (operation)
				Potential downstream impacts on water quality of Loirston Loch due to risk of spills during construction or runoff during operation.	Medium negative	Moderate
S3 Wood/scrub mosaic east of Greenhowe	Local	0 – 500m	Construction / Operation	No direct mortality predicted due to absence of roosts under alignment Potential RTA if bats attempt to cross the road along potential commuting route.	Negligible (construction), low negative (operation)	Negligible (construction), Minor (operation)
				Loss of Greenhowe Quarry Pond and subsequent loss of aquatic invertebrate foraging resource and potential swarming site.	High Negative	Minor
				Proposed scheme and construction works will fragment foraging habitat with approx. 30% south of the scheme and 70% north of the scheme, with implications for foraging behaviour; severance of potential commuting route along woodland edge.	Medium negative	Minor
				Disturbance to foraging and commuting bats likely due to construction works and traffic.	Medium negative	Minor
				No pollution predicted due to loss of water feature.	Negligible	Negligible
S4 Bog south of Greenhowe	Local	200 – 350m	Construction / Operation	No direct impacts predicted due to distance from scheme.	Negligible	Negligible

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
S5 Agricultural fields south of Greenhowe	Local	0 – 500m	Construction / Operation	No direct impacts predicted due to lack of resources under alignment.	Negligible	Negligible
S6 Greenhowe	Local	0 – 500m	Construction / Operation	No direct mortality predicted due to absence of roosts under alignment.	Negligible	Negligible
				Loss of low value conifer plantation woodland and foraging habitat due to construction and operation.	Low negative	Minor
				Severance of rides and fragmentation of foraging habitats.	Medium negative	Minor
				Some disturbance possible to foraging and commuting bats due to construction works and traffic but small number of bats impacted.	Low negative	Minor
				No pollution predicted due to lack of watercourses	Negligible	Negligible
S7 Duff's Hill	Local	0 – 500m	Construction / Operation	No significant direct impacts predicted due to lack of resources under alignment.	Negligible	Negligible
S8 Agricultural fields west of Duff's Hill	County	0 – 500m	Construction / Operation	No significant direct impacts predicted due to lack of resources under alignment.	Negligible	Negligible
S9 Wood west of Greenhowe	County	0 – 500m	Construction / Operation	No direct mortality predicted during construction due to absence of roosts under alignment; RTA possible due to operation due to severance of Causey Maunth Road and associated commuting route.	Negligible (construction) Medium negative (operation)	Negligible (Construction) Moderate (operation)
				No habitat loss predicted due to absence of resources under alignment.	Negligible	Negligible
				Severance of pipistrelle bat commuting route along Causey Maunth Road although small numbers of bats would be impacted.	Medium negative	Moderate
				Disturbance of commuting bats likely during operation of road due to severance of commuting route.	Medium negative	Moderate
				No pollution predicted due to absence of water features	Negligible	Negligible
S10 Hare Moss	County	0 – 500m	Construction / Operation	No direct mortality predicted due to absence of roosts under alignment and no fragmentation during operation.	Negligible	Negligible
				Potential hydrological impacts on the Moss due to operation with potential consequences on the suitability of the Moss as a foraging resource.	Medium negative	Moderate

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
				No fragmentation predicted due to loss of extreme southern edge of Moss habitat and lack of resources on southern side of road.	Negligible	Negligible
				Disturbance to foraging behaviour of bats likely due to disturbance during construction and traffic during operation.	Low negative	Minor
				Pollution of moss and Burn of Ardoe and associated reduction in suitability of foraging habitat due to spills during construction and operation.	Medium negative	Moderate

Section SL2

5.3.10 Only two of the six HA's in Section SL3 would be directly impacted by the construction and operation of the proposed scheme; other habitats may be affected indirectly due to the severance of commuting routes and subsequent reduction in the availability of resources either side of the road.

5.3.11 During the construction phase direct mortality may be an issue if bats are roosting in Greenloanings Cottage south of Hill of Blairs which would be demolished. However the building was assessed as having relatively low roost potential and, as such, is unlikely to support large numbers of bats. This impact has been assessed as being of medium negative magnitude and Moderate significance.

5.3.12 Habitat loss would be minimal in this section, limited to the loss of scrub and some mature broadleaved trees along a foraging and commuting route at Merchant's croft. The impacts on the local bat population have been assessed as medium negative in magnitude and of Moderate significance. Severance as a result of the construction of access roads and plant would be predicted to have an impact of medium negative magnitude and Moderate significance if located on commuting routes in S13 or S16 (between Bishopston and Burnhead); disturbance to commuting bats during construction would be predicted if light or noise caused bats to find alternative flight paths, resulting in impacts of medium negative magnitude and Moderate significance in S13 and S16. Minimal pollution would be predicted if there were spills near Whiteside Burn during construction, resulting in impacts of low negative magnitude and Minor significance if the suitability of foraging habitat were altered.

5.3.13 As for construction, the operational scheme would be predicted to cause severance and disturbance to commuting bats at a number of commuting routes, at Bishopston, access roads, the road between Clochandighter and Shanna Burn Wood, Merchants Croft and Burnhead, effectively fragmenting the foraging and roosting habitats etiher side of the road if bats could not cross. The impact on the county significant bat populations using S13 and S16 have assessed as being of medium negative magnitude and Moderate significance. Such severance may also cause some direct mortality, assessed as an impact of medium negative magnitude and Moderate signficiance.

5.3.14 Minimal pollution would be predicted if there were spills near Whiteside Burn during construction, resulting in an impact of low negative magnitude and Minor significance if the suitability of foraging habitat were altered in the operation of the scheme.

5.3.15 The potential impacts of the proposed scheme on bat populations in Section SL2 are shown in Table 35 below.

Table 35 – Assessment of Potential Impacts Section SL2

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
S11 North of Sunnyside	Local	10 – 150m	Construction / Operation	No direct impacts predicted as woodland to be retained.	Negligible	Negligible
S12 Greenloaning Wood	Local	300 – 500m	Construction / Operation	No direct impacts predicted due to distance from proposed scheme.	Negligible	Negligible
S13 Agricultural fields around Sunnyside to Causeyport	County	0 – 500m	Construction / Operation	No direct mortality predicted due to absence of roosts under proposed alignment.	Negligible	Negligible
				No significant loss of habitat due to low value of habitats directly under alignment.	Negligible	Negligible
				Severance of three commuting routes due to construction works and traffic creating barrier to movement north-south across scheme between foraging and roosting habitat during operation with implications for commuting pipistrelle and brown long-eared bats.	Medium negative	Moderate
				Disturbance of commuting behaviour during construction and operation due to fragmentation of commuting routes.	Low negative	Minor
				No pollution predicted due to lack of crossings in this HA.	Negligible	Negligible
S14 Clochan-dighter Wood	Local	100m – outside study area	Construction / Operation	No direct impacts predicted due to distance from scheme; indirect fragmentation due to woodland and associated foraging habitats being cut off from roosting and alternative foraging habitat to the north of the scheme during operation as per S13/S16.	Medium negative	Minor
S15 Whitestone Wood and Hill of Blairs	County	10m – outside study area	Construction / Operation	No direct impacts predicted due to distance from scheme; indirect fragmentation due to woodland and associated foraging habitats being cut off from roosting and alternative foraging habitat to the south of the scheme during operation as per S13/S16.	Medium negative	Moderate
S16 Agricultural fields to the east of Burnhead to Greenloaning	County	0 – 500m	Construction	Direct mortality possible if bats are roosting in Greenloanings Cottage which would be demolished under the proposed scheme. Building unlikely to support population of bats of above local significance due to relative paucity of access points.	Medium negative	Moderate
				Minimal loss of scrub habitat due to construction of scheme with implications for foraging bats; loss of part of tree-lined avenue at Merchant's Croft with implications for foraging and commuting bats.	Medium negative	Moderate

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
				Severance of three commuting routes at Bishopston, Merchant's Croft and Burnhead and subsequent fragmentation of foraging and roosting habitats along extensively used commuting routes if bats cannot cross scheme at.	High negative	Moderate
				No roosting bats likely to be disturbed but foraging and commuting behaviour likely to be affected by disturbance due to construction of scheme.	Medium negative	Moderate
				Minimal pollution predicted due to the small nature of the burns crossed in this section; minimal impacts on suitability for foraging bats.	Low negative	Minor
			Operation	Direct mortality due to RTA if bats continue to try and cross road along unmitigated commuting routes.	High negative	Moderate
				Permanent loss of scrub and mature broadleaved trees along farm access track at Merchant's Croft would have implications for foraging and commuting bats.	Medium negative	Moderate
				Severance of three commuting routes at Bishopston, Merchant's Croft and Burnhead and subsequent fragmentation of foraging and roosting habitats along extensively used commuting routes if bats cannot cross scheme at.	High negative	Moderate
				Disturbance of flight routes and activity patterns if bats continue to attempt to cross the operational road.	Medium negative	Moderate
				Minimal pollution predicted due to the small nature of the burns crossed in this section; minimal impacts on suitability for foraging bats.	Low negative	Minor

Section SL3

5.3.16 In Section SL3, there is a potential risk of direct mortality during construction of the road. Although no roosts have been identified under the alignment, trees with roost potential will be felled in Cleanhill Wood (county importance), the banks of Blaikiewell Burn (regional importance), Kingcausie (regional importance) and along South Deeside Road (county importance). This would result in impacts of high negative magnitude and Moderate – Major significance. Habitat loss during the construction of the scheme and associated access roads and compounds would result in impacts of medium negative magnitude and Moderate significance on the bat populations at Cleanhill Wood, the banks of Blaikiewell Burn, Kingcausie and the Old Deeside Line (county importance) and impacts of low negative magnitude and Minor significance at the South Deeside Road and the River Dee (regional importance). The loss of many mature broadleaved trees in this section of the proposed AWPR would affect the availability of high value roosting and foraging habitat in a strategically important area of Aberdeenshire along Deeside. Fragmentation of commuting routes and foraging/roosting habitat along this green corridor during construction would result in impacts of medium - high negative magnitude and Minor significance at the fields around Blaikiewell Farm (local importance), Moderate significance at Cleanhill Wood, Blaikiewell Burn, Eastland (regional importance), South Deeside Road and the Old Deeside Line, whereas the fragmentation of regionally significant resources in Kingcausie and the River Dee would be considered to result in impacts of high negative magnitude and Major significance.

5.3.17 Disturbance and disruption of roosting, foraging and commuting bats as a result of increased human presence, felling, junction and bridge construction would be an issue at Blaikiewell, Cleanhill, Blaikiewell Burn, the River Dee and the Old Deeside Line, resulting in impacts of medium negative magnitude and Minor – Moderate significance. The probable disturbance of roosts at Eastland and Kingcausie would result in impacts of high negative magnitude and Major significance if the roosts became unsuitable for use. Disturbance would be an impact of low negative and Minor significance at the South Deeside Road.

5.3.18 Pollution due to accidental spills during construction would result in a reduction in the suitability of foraging habitat resources at Blaikiewell Burn, Kingcausie Burn and Milltimber Burn (assessed as impacts of medium negative magnitude and Moderate significance) the River Dee (impacts of high negative magnitude and Major significance). Impacts on this key Habitat Area would have wide-ranging implications for foraging bats downstream of the crossing.

5.3.19 During the operational phase the presence of a barrier of moving traffic across features which bats currently use for navigation would potentially result in RTA if bats could not cross the road safely to reach resources on the other side. This would result in an impact of high negative magnitude and Major significance at Eastland and Kingcausie where maternity roosts nearby would be cut off from resources on the other side; impacts of high negative magnitude and Moderate significance would be predicted where the scheme crosses Cleanhill Wood and the Old Deeside Line. RTA would not be an issue at the River Dee despite the importance of the resource to bat populations, as the proposed crossing will be high enough for bats to fly safely underneath. Similarly RTA would not be expected to occur at Blaikiewell Burn or South Deeside Road due to the provision of safe crossing points as part of the road design.

5.3.20 Permanent long-term habitat loss would constitute an impact of medium negative and Moderate significance at Blaikiewell Burn, Cleanhill Wood and the Old Deeside Line where the loss of high value broadleaved woodland and scrub plantation would be likely to result in a change in the distribution of local bat populations. Habitat loss would be an impact of high negative magnitude and Major significance where the scheme cuts through Kingcausie and where Kingcausie Burn would be realigned; and an impact of low negative magnitude and Minor significance at South Deeside Road and the River Dee where only small numbers of trees would be felled.

5.3.21 Fragmentation would potentially be an impact of medium negative magnitude and Moderate significance at field south of Cleanhill and near Eastland, where the presence of the road is likely to result in bats being forced to find alternative routes to key habitat areas. Severance of fields around Blaikiewell Farm would result in impacts of medium negative magnitude and Minor significance; and at Cleanhill Wood the impacts would be of high negative magnitude and Moderate signficance.

The greatest fragmentation issue would be in Kingcausie as the effective loss of habitat on either side of the road would be likely to result in a re-evaluation of the site and the impact has been assessed as of high negative magnitude and major significance. There would not be an issue with habitat fragmentation at Blaikiewell Burn. South Deeside Road or the River Dee due to adequate provision for bats to fly underneath the crossing.

5.3.22 Disturbance of roosting bats would potentially be an issue at Eastland which could result in roost abandonment if the current circumstances are not retained during operation. This has been assessed as an impact of high negative magnitude and Major significance. Elsewhere bats would be expected to become accustomed to the road although there may still be disturbance of foraging and commuting behaviour at Cleanhill Wood, Blaikiewell Burn, Kingcausie, the River Dee (if lighting were used) and the Old Deeside Line with impacts of medium negative magnitude and Moderate significance; an impact of medium negative magnitude and Minor significance would be predicted at South Deeside Road.

5.3.23 Potential pollution of the River Dee during operation would have an adverse impact upon prey species available which has been assessed as high negative magnitude and Major significance. Due to the importance and scarcity of such foraging resources in the locality; impacts of medium negative magnitude and Moderate significance would be predicted at Blaikiewelll Burn, Kingcausie Burn and Milltimber Burn.

5.3.24 The potential impacts of the proposed scheme on bat populations in Section SL3 are shown in Table 36 below.

Table 36 – Assessment of Potential Impacts Section SL3

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
S17 Agricultural fields south of Cleanhill Wood	County	50 – 500m	Construction / Operation	No direct mortality, habitat loss, disturbance or pollution predicted due to distance from scheme.	Negligible	Negligible
				Indirect severance due to construction and operation as a result of severance of commuting route along burnhead as per S16 and breakdown of linear route between key habitats in Kingcausie and south of proposed scheme.	Medium negative	Moderate
S18 Durris Forest	Local	300m – outside study area	Construction / Operation	No direct impacts predicted due to distance from scheme.	Negligible	Negligible
S19 Blaikiewell Farm	Local	0 – 300m	Construction / Operation	No direct mortality due to construction due to absence of roosts under alignment.	Negligible	Negligible
				Minimal habitat loss due to construction and operation due to overall low value of habitats.	Negligible	Negligible
				Fragmentation of habitat area would cut building and potential roost opportunities off from foraging/roosting habitats in Kingcausie and Cleanhill.	Medium negative	Minor
				Minimal disturbance to foraging bats possible during construction of junction.	Medium negative	Minor

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
				No pollution predicted due to absence of watercourses.	Negligible	Negligible
S20 Cleanhill Wood	County	0 – 500m	Construction	Direct mortality possible during felling of potential roost trees.	High negative	Moderate
				Loss of mature broadleaved and conifer plantation woodland and associated foraging and roosting potential due to clearance for construction and access roads/plant.	Medium negative	Moderate
				Fragmentation of woodland area due to clearance for construction.	High Negative	Moderate
				Disturbance of foraging, roosting and commuting bats likely due to construction.	Medium negative	Moderate
				No pollution predicted due to absence of watercourses	Negligible	Negligible
			Operation	Direct mortality due to RTA if bats continue to fly across scheme during operation.	High negative	Moderate
				Loss of mature broadleaved and conifer plantation woodland and associated foraging and roosting potential on either side of the road if bats cannot cross; permanent loss of a strip of woodland.	High negative	Moderate
				Fragmentation and severance of Cleanhill Wood along a green corridor and isolation of features either side of the road if bats cannot cross safely.	High negative	Moderate
				Disturbance of commuting and foraging corridors likely due to disturbance from the road.	Medium negative	Moderate
				No pollution predicted due to absence of watercourses.	Negligible	Negligible
S21 Agricultural fields below Parkhead	Less than local	300m – outside study area	Construction / Operation	No impacts predicted due to distance from scheme and lack of resources.	Negligible	Negligible
S22 Floodplain and immediate surrounds of Crynoch Burn (north) and Blaikiewell Burn	Regional	0 – 400m	Construction	Direct mortality if bats roosting in trees to be felled.	High negative	Major
				Loss of riparian and woodland edge habitat and associated foraging and roosting habitat along Blaikiewell due to construction of buried structure and underbridge.	Medium negative	Moderate
				Fragmentation of foraging routes and severance of commuting routes along edge of Cleanhill Wood and Blaikiewell Burn and road due to construction of buried structure and bridge.	Medium negative	Moderate

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
				Disturbance of foraging and commuting behaviour likely due to construction activities.	Medium negative	Moderate
				Potential pollution of Blaikiewell Burn and downstream impacts on Crynoch Burn and suitability as foraging habitat due to spills during construction.	Medium negative	Moderate
			Operation	No direct mortality predicted from RTA due to retention of commuting routes and foraging corridors during operation due to provsion of buried structure and underbridge.	Negligible	Negligible
				Loss of roosting and foraging habitat due to operation of the road.	Medium negative	Moderate
				Fragmentation of foraging corridors and commuting routes unlikely to occur due to provision of safe crossing points large enough for bats to fly through and subsequent retention of connectivity.	Negligible	Negligible
				Some long term disturbance of roosting, foraging and commuting behaviour due to the operation of the road.	Medium negative	Moderate
				Potential pollution of Blaikiewell Burn and downstream impacts on Crynoch Burn and associated suitability for foaging due to spills and polluted runoff.	Medium negative	Moderate
S23 Agricultural fields within Kingcausie	Regional	0 – 200m	Construction	No direct mortality predicted due to absence of roosts or potential roosts under alignment.	Negligible	Negligible
				Minimal loss of habitat predicted due to low inherent value of agricultural land for bats.	Negligible	Negligible
				Fragmentation of foraging habitat and commuting routes due to proximity to roost at Eastland.	Medium negative	Moderate
				Disturbance of roosting bats and subsequent abandonment of roost possible during construction if roost characteristics including linear commuting features and light levels change.	High negative	Major
				No pollution predicted due to absence of watercourses.	Negligible	Negligible
			Operation	Direct mortality due to RTA if bats continue to fly from roost to foraging habitats in Kingcausie across the road.	High negative	Major

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
				No significant permanent habitat loss predicted due to absence of features under alignment.	Negligible	Negligible
				Some fragmentation of roosting and foraging corridors due to proximity of road to rooat at Eastland although alternative safe crossing point will be provided at Kingcausie/Eastlad accommodation underbridge.	Medium negative	Moderate
				Disturbance and permanent displacement of bats from roost if roost characteristics change or roost becomes unsuitable for bats.	High negative	Major
				No pollution predicted due to absence of watercourses.	Negligible	Negligible
S24 Kingcausie	Regional	0 – 500m	Construction	Direct mortality if bats roosting in trees to be felled.	High negative	Major
				Loss of woodland, edge and riparian habitat and associated foraging and roosting habitat due to construction and burn realignment.	Medium negative	Moderate
				Fragmentation of woodland habitats and severance of roosts on either side of the road.	High negative	Major
				Disturbance of foraging, roosting and commuting bats likely due to construction works in woodland.	Medium negative	Moderate
				Potential pollution of Kingcausie Burn and downstream effects on Crynoch Burn with associated impacts on aquatic insect availability due to spills during construction.	Medium negative	Moderate
			Operation	Direct mortality due to RTA if bats continue to cross road to get to resources on the other side during operation.	High negative	Major
				Loss of woodland, edge and riparian foraging habitat due to operation.	High negative	Major
				Fragmentation of high value woodland foraging habitat and commuting routes between maternity roost sites and effective loss of woodland habitat either side if bats cannot cross.	High negative	Major
				Disturbance of foraging and commuting bats due to operation of road and reduction in suitability of foraging sites from light and traffic noise.	Medium negative	Moderate

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
				Potential pollution of realigned Kingcausie Burn and downstream impacts on Crynoch Burn due to spills and polluted runoff during operation.	Medium negative	Moderate
S25 Caravan Park	Local	250 – 500m	Construction / Operation	No direct impacts predicted due to distance from scheme.	Negligible	Negligible
S26 Old Mill Inn and agricultural field surrounds	Local	250m – outside study area	Construction / Operation	No direct impacts predicted due to distance from scheme.	Negligible	Negligible
S27 Agricultural fields south of the River Dee	County	0m – outside study area	Construction	Direct mortality if bats roosting in trees to be felled during construction.	High negative	Moderate
				Minimal loss of potential roost trees and foraging/commuting habitat alongside South Deeside Road.	Low negative	Minor
				Severance of commuting route along B9077 South Deeside Road due to construction of Dee Crossing.	Medium negative	Moderate
				Minimal disturbance and disruption of roosting, commuting and foraging bats due to felling and bridge construction.	Low negative	Minor
				No pollution predicted due to absence of watercourses.	Negligible	Negligible
			Operation	Direct mortality due to RTA during operation of the road not predicted due to retention of safe crossing points.	Negligible	Negligible
				Minimal permanent habitat loss of mature broadleaved trees and foraging/roosting habitat along South Deeside Road.	Low negative	Minor
				No permanent fragmentation or severance of commuting routes predicted due to retention of commuting routes under Dee Crossing so connectivity along the green corridor is retained	Negligible	Negligible
				Minimal disturbance due to operational scheme (traffic noise and lights).	Low negative	Minor
				No pollution predicted due to absence of watercourses.	Negligible	Negligible
S28 Floodplain and immediate surrounds of the River Dee	Regional	0m – outside study area	Construction	No direct mortality predicted due to absence of roosting opportunities under scheme.	Negligible	Negligible
				Minimal loss of riparian and bankside habitat due to clearance for construction.	Low negative	Minor

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
				Fragmentation of foraging and commuting route along the River Dee during bridge construction and effective loss of habitat either side if bats cannot fly through.	High negative	Major
				Disruption of foraging and commuting behaviour likely over the river due to bridge construction.	Medium negative	Moderate
				Potential pollution of the River Dee due to spills during construction and associated downstream impacts on suitability of river for foraging.	High negative	Major
			Operation	No direct mortality predicted due to high span bridge with space for bats to fly safely underneath.	Negligible	Negligible
				Minimal permanent habitat loss predicted along the river banks.	Low negative	Minor
				No fragmentation or severance of foraging or commuting routes predicted due to retention of flight path underneath Dee Crossing.	Negligible	Negligible
				Disturbance of foraging and roosting bats in the woodland adjacent to the Dee if lights shine on the river.	Medium negative	Moderate
				Potential pollution of the River due to contaminated runoff during operation with downstream impacts on water quality and foraging suitability.	High negative	Major
S29 Agricultural fields south of Milltimber	County	0m – outside study area	Construction / Operation	No direct mortality predicted due to absence of potential roosts under alignment.	Negligible	Negligible
				Loss of farmland habitat would not affect the foraging habitat resource.	Negligible	Negligible
				No fragmentation predicted as commuting routes do not cross the scheme.	Negligible	Negligible
				No disturbance predicted due to absence of foraging habitat.	Negligible	Negligible
				Minimal pollution predicted due to spills or contaminated runoff to Milltimber Burn and the River Dee during construction and operation resulting in reduced suitability of downstream foraging habitats.	Medium negative	Moderate

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
S30 Camphill School	Regional	50m – outside study area	Construction / Operation	No direct impacts predicted due to distance from scheme. Indirect severance due to scheme crossing Old Deeside Line is assessed for S31 below.	Negligible	Negligible
31 Deeside Old Railway Line	County	0m – outside study area	Construction / Operation	No direct mortality predicted during construction due to absence of trees with roost potential under alignment.	Negligible	Negligible
				Direct mortality due to RTA during operation due to severance of commuting route and no provision for bats to cross.	High negative	Moderate
				Loss of strip of broadleaved woodland and scrub alongside Old Deeside Line and associated reduction in suitability of foraging habitat.	Medium negative	Moderate
				Fragmentation of commuting route along the old railway line with subsequent fragmentation of foraging and roosting habitats along a green corridor.	High negative	Moderate
				Disruption of bat commuting routes and foraging habitat due to construction and operation will affect behaviour and may force bats to find alternative routes.	Medium negative	Moderate
				No pollution predicted due to absence of watercourses.	Negligible	Negligible

Section SL4

5.3.25 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 (thought to be a maternity roost) at the International School in Milltimber (regional importance). These impacts have been assessed as of high negative magnitude and Major significance to local bat populations of both species. 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 in Milltimber although the loss of the building would only represent a relatively small loss in relation to the entire area and is assessed as being of low negative magnitude and Minor significance. Similar impacts on a smaller scale would be predicted where construction activities would disrupt bat activity at Beanshill House (county value). Fragmentation of commuting routes due to junction construction would be an issue in Milltimber and between Guttrie Hill and Milltimber Wood which are currently connected by suitable linear wooded habitats along the roads and access lanes; these impacts have been assessed as of medium negative magnitude and Moderate significance. 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 Regional value (S32 and S33), and county value (Beanshill House) for bats these impacts have been assessed as being of medium negative magnitude and Moderate significance.

5.3.26 During operation of the scheme, there is a risk of direct mortality as a result of RTAs where the road would cross commuting routes in Milltimber , including the access track to Culter House Wood (HA's S32, S33, S35, S36). These impacts have been assessed as of medium - high negative magnitude and Moderate to Major significance for County and Regional Value HA's. No RTA risk is predicted elsewhere despite the severance of commuting routes during operation (Beans Hill and

Contlaw Road). This is because the road here will pass through a cutting alternative crossing points will be provided as part of the design of the scheme. 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. Habitat fragmentation would occur from the loss of habitat either side of the road at Milltimber if connectivity for bats was not provided. These impacts have been assessed as being of medium negative magnitude and Moderate significance. The indirect severance of commuting routes at Beans Hill (S38/S39 – county and local value respectively) would only be likely to affect small numbers of bats and alternative commuting routes exist so this impact is assessed as being of low negative magnitude and Minor significance.

5.3.27 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 in Miltimber and at Airy Park Cottage. These impacts are assessed as being of low negative magnitude and Minor significance.

5.3.28 No significant impacts of pollution on local bat foraging habitat are predicted during construction or operation, due to the absence of suitable watercourses in this section.

5.3.29 The potential impacts of the proposed scheme on bat populations in Section SL4 are shown in Table 37 below.

Table 37 – Assessment of Potential Impacts Section SL4

Habitat Area	Evaluation	Distance from Scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
S32 East Peterculter and western Milltimber	Regional	0 – 500m	Construction	Direct mortality due to the demolition of a mixed brown long-eared and pipistrelle maternity roost at the International School.	High negative	Major
				Loss of roost (and potential hibernaculum) at the International School and associated urban foraging habitat.	High negative	Major
				Fragmentation of foraging and roosting habitats due to construction works and provision of access roads.	Medium negative	Moderate
				Disturbance to bats roosting elsewhere in the Habitat Area is likely, and disruption to bat activity due to vibration, noise and light is possible.	Medium negative	Moderate
				No pollution predicted due to absence of watercourses.	Negligible	Negligible
			Operation	Direct mortality due to the severance of commuting routes along North Deeside Road and Culter house Lane if bats continue to fly across.	High negative	Major
				Permanent loss of large roost including scarce maternity roost/hibernaculum conditions.	High negative	Major
				Road will fragment urban area with foraging and roosting areas on both sides, but commuting routes will exist at North Deeside Road and Milltimber junction.	Medium negative	Moderate

Habitat Area	Evaluation	Distance from Scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
				Permanent disturbance to foraging and roosting habitats possible due to disturbance from road traffic and lighting at the junction but bats will gradually become accustomed to the disturbance which is unlikely to be significantly different from existing levels.	Low negative	Minor
				No pollution predicted due to absence of watercourses.	Negligible	Negligible
S33 Milltimber	Regional	0 – 500m	Construction	Direct mortality possible due to demolition of potential roosts in Milltimber Brae.	Medium negative	Moderate
				Loss of potential roosts and associated urban foraging habitat due to demolition.	Low negative	Minor
				Fragmentation of foraging and roosting habitats due to construction works and provision of access roads.	Medium negative	Moderate
				Disturbance to bats roosting elsewhere in the Habitat Area is likely, and disruption to bat activity due to vibration, noise and light.	Medium negative	Moderate
				No pollution predicted due to absence of watercourses.	Negligible	Negligible
			Operation	Direct mortality due to the severance of commuting routes along North Deeside Road, Culter house Lane and Old Deeside Line (as per S31) if bats continue to fly across.	High negative	Major
				Permanent loss of potential roosts and foraging habitat in area where alternative roosts exist.	Low negative	Minor
				Road will fragment urban area with foraging and roosting areas on both sides, but commuting routes will exist at North Deeside Road and Milltimber junction.	Medium negative	Moderate
				Permanent disturbance to foraging and roosting habitats possible due to disturbance from road traffic and lighting at the junction but bats will gradually become accustomed to the disturbance which is unlikely to be significantly different from existing levels.	Low negative	Minor
				No pollution predicted due to absence of watercourses.	Negligible	Negligible
S34 Guttrie Hill	County	0 – 500m	Construction / Operation	No direct mortality due to construction, habitat loss or pollution predicted due to distance of wood from scheme.	Negligible	Negligible

Habitat Area	Evaluation	Distance from Scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
				RTA risk and indirect fragmentation of habitats due to road passing between woodland and nearby Guttrie Wood, effective loss of either woodland and associated foraging habitat if bats cannot cross.	Medium negative	Moderate
S35 Milltimber Wood	County	150 – 500m	Construction / Operation	No direct mortality due to construction, habitat loss or pollution predicted due to distance of wood from scheme	Negligible	Negligible
				RTA risk and indirect fragmentation of habitats due to road passing between woodland and nearby Guttrie Wood, effective loss of either woodland and associated foraging habitat if bats cannot cross.	Medium negative	Moderate
S36 Agricultural fields around Nether Beanshill	Local	0 – 500m	Construction / Operation	No significant impacts predicted due to lack of resources under alignment.	Negligible	Negligible
S37 Woodland from Hill Farm to Westfield Lodge	County	0 – 300m	Construction	No direct mortality predicted during construction due to absence of roosts under alignment.	Negligible	Negligible
				Loss of woodland habitat in gardens at Beanshill along with associated shelter and foraging/commuting resource due to construction of overbridge.	Low negative	Minor
				Severance of commuting route due to construction of overbridge and removal of linear navigation link between roosts at Beanshill and alternative roosts/foraging areas in Milltimber.	Medium negative	Moderate
				Disturbance of roosting and foraging bats due to proximity to roosts at Airy Park Lodge and Beanshill house roosts and woodland area.	Medium negative	Moderate
				No pollution predicted due to absence of watercourses.	Negligible	Negligible
			Operation	No direct mortality due to RTAs due to provision of safe crossing point at Contlaw Road overbridge.	Negligible	Negligible
				Minimal permanent loss of woodland habitat in gardens at Beanshill along with associated shelter and foraging/commuting resource.	Low negative	Minor

Habitat Area	Evaluation	Distance from Scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
				Commuting route would be retained due to provision of Contlaw Road overbridge thus retaining linear navigation link between roosts at Beanshill and alternative roosts/foraging areas in Milltimber.	Negligible	Negligible
				Some disturbance of roosting and foraging bats possible due to proximity of operational scheme to roosts at Airy Park Lodge and Beanshill house roosts and woodland area.	Low negative	Minor
				No pollution predicted due to absence of watercourses.	Negligible	Negligible
S38 Improved fields	County	0m – outside study area	Construciton / Operation	No direct mortality due to construction or operation (due to road being in a cutting), habitat loss, disturbance or pollution predicted due to absence of resources under alignment.	Negligible	Negligible
				Severance of infrequently used commuting route along an access track although alternative commuting routes will exist at Contlaw Road and along scheme.	Low negative	Minor
S39 Beans Hill	Local	0m – outside study area	Construction / Operation	No direct mortality due to construction, habitat loss, disturbance or pollution predicted due to absence of resources under alignment.	Negligible	Negligible
				Indirect severance as per S38 during operation.	Low negative	Minor

Section SL5

5.3.30 In Section SL5 direct mortality as a result of the construction of the proposed scheme due to felling or demolition is not expected as no roosts or potential roosts would be destroyed due to the low overall value of roosting habitat to be removed during construction.

5.3.31 Habitat loss is likely to be a significant issue throughout this section due to the resulting severance of high value foraging and commuting habitat along a wildlife corridor. For agricultural fields around Silver Burn (regional value), East Silver Burn (county value), Kingshill Wood (county value) and agricultural fields to the west of Kingshill Wood (regional value) the impacts on bats have been assessed as low (S43, S44) - medium negative in magnitude and of Minor - Moderate significance if compounds and access roads are insensitively placed.

5.3.32 Fragmentation and severance would be predicted to be an issue at the Silver Burn road, Gairnhill Access and Gairnhill road which have been recorded as bat commuting routes which would cross the proposed alignment. Insensitive siting of construction compounds and loss of linear features which bats use for navigating may result in re-evaluation of the key resources on either side. These impacts have been assessed as medium negative magnitude and Moderate significance during construction at S40, S41 and S42, S44 and S45 .

5.3.33 Some disturbance due to construction noise and vibration and alteration to roost entrances and local commuting routes may occur at bat roosts at Ard-Na-Moine, Silverburn House, a roost (which may be used in the winter) at Moss Side of Auchlea and at Backhill of Brodiach and Craiglug which exist close to the proposed scheme, resulting in impacts of medium negative magnitude and Moderate significance in HA's S40, S44 and S45. In addition Kingshill and Gairnhill Woods (S43)

and East Silverburn (S42) provide valuable commuting and foraging habitat which may also be disturbed resulting in impacts of medium negative magnitude and Moderate significance.

5.3.34 During the operation of the road, direct mortality due to RTAs would be predicted to occur where the scheme crosses the commuting route at Silver Burn Road. Due to the high frequency of bats using this commuting route this has been assessed as being of medium - high negative magnitude and Moderate - Major significance. Where Gairnhill Road and the Gairnhill Access roads and access to Moss Side of Auchlea will be severed , direct mortality due to RTAs would also be predicted to bats commuting between Auchlea Moss and Kingshill/Gairnhill Woods. Due to the relatively small numbers of bats that would be impacted in most of this area this impact is predicted as being of medium negative magnitude and Moderate significance, Severance of the commuting route along the access to Auchlea Moss would be severed the resulting RTA could be significant to hibernating bats due to the proximity to the roost, resulting in an impact of high negative magnitude and Major significance.

5.3.35 Similarly the severance of commuting routes and fragmentation along a wildlife corridor is assessed as being an impact of high negative magnitude and Major significance at S40 and S45 where severance of roosts on the west from foraging resources in the east would be expected to have implications for the long term viability of roosting bat populations and change the evaluation of the site; impacts of high negative magnitude and Moderate significance are predicted at S42 and S43, and of medium negative magnitude and Moderate significance at S41; due to the indirect nature of severance here.

5.3.36 Permanent loss of habitat would be an issue (as per construction) in this section due to the resulting severance of high value commuting habitat, although the scheme passes predominantly through agricultural fields and avoids the majority of the highest value foraging habitat. However the impacts of habitat loss on local bat populations would be expected to be of medium negative magnitude and Moderate significance in HA's S40 and S42; of low negative magnitude and Minor significance where the southern edge of Kinshill Wood and some scrub-lined walls to the west of Gairnhill Wood would be removed (S43 and S44). At the Moss of Auchlea the potential for indirect impacts on the water quality and the hydrological regimes have been assessed as being of high negative and Major significance.

5.3.37 Disturbance during the operation of the scheme may affect bats roosting nearby and foraging and commuting bats may be affected by noise and lighting in the currently undisturbed woodland at Kingshill and Gairnhill Wood, along Silver Burn Road, Gairnhill Road and Gairnhill Access. This would result in impacts of medium magnitude and Moderate significance if disturbance were high enough to force bats to find alternative resources away from the road.

5.3.38 Pollution due to spills and runoff from the construction and operation of the road is most likely to effect the water quality and insect availability of Silver Burn, Gairn Burn and Upper Beanshill Burn, potentially resulting in impacts of medium magnitude and Moderate significance at these watercourses if the foraging resource or the suitability of the habitats they support were to reduce.

5.3.39 The potential impacts of the proposed scheme on bat populations in Section SL5 are shown in Table 38 below.

Table 38 – Assessment of Potential Impacts Section SL5

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
S40 Agricultural fields around Silver Burn	Regional	0 – 500m	Construction	No direct mortality predicted due to absence of roosts under alignment.	Negligible	Negligible
				Loss of foraging and commuting habitat along road.	Medium negative	Moderate
				Severance and fragmentation of commuting habitats if construction compounds or access roads sever Silverburn road.	Medium negative	Moderate
				Disturbance possible during construction due to the proximity of roosts, including a maternity roost at Silverburn House, to the proposed scheme if works compounds are located nearby.	Medium negative	Moderate
				Potential pollution impacts due to runoff from scheme into Silver Burn, Gairn Burn and Ord Burn and downstream impacts on foraging resources including Silver Dam.	Medium negative	Moderate
			Operation	Direct mortality due to RTAs from severance of commuting route.	High negative	Major
				Permanent loss of foraging and commuting habitat.	Medium negative	Moderate
				Severance and fragmentation of commuting habitats particularly where Silver Burn road crosses the proposed alignment, near maternity route and along green corridor.	High negative	Major
				Disturbance of commuting bats likely during operation of road due to severance of commuting route.	Medium negative	Moderate
				Potential pollution impacts due to runoff from scheme into Silver Burn, Gairn Burn and Ord Burn and downstream impacts on foraging resources including Silver Dam.	Medium negative	Moderate
S41 Silver Burn Wood	County	250m-500m	Construction / Operation	No direct impacts predicted due to distance from scheme.	Negligible	Negligible
				Indirect severance due to the proposed scheme severing a commuting route along Silverburn Road and severance along a green corridor as per S40.	Medium negative	Moderate
S42 East Silver Burn	County	0 –300m	Construction	No direct mortality predicted due to absence of roosts under alignment.	Negligible	Negligible
				Loss of foraging and commuting habitat if construction compounds insensitively located.	Medium negative	Moderate
				Severance and fragmentation of commuting habitats if construction compounds or access roads sever Silverburn road.	Medium negative	Moderate

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
				Disturbance possible during construction due to the proximity of roosts to proposed scheme if works compounds are located nearby.	Medium negative	Moderate
				Potential pollution impacts due to construction works located near Silver Burn, Gairn Burn and Upper Beanshill Burn.	Medium negative	Moderate
			Operation	Direct mortality due to RTA s from severance of commuting route.	High negative	Moderate
				Permanent loss of edge of Rotten O'Gairn DWS woodland and wet foraging habitats, and commuting habitat.	Medium negative	Moderate
				Severance and fragmentation of commuting habitats particularly where Silver Burn road crosses the proposed alignment, near maternity route and along green corridor as per S40.	High negative	Moderate
				Disturbance of commuting bats and disruption of foraging areas likely during operation of road due to severance of commuting route.	Medium negative	Moderate
				Potential pollution impacts due to runoff from to scheme into Silver Burn, Gairn Burn and Upper Beanshill Burn.	Medium negative	Moderate
S43 Gairnhill and Kingshill Wood	County	0 – 500m	Construction / Operation	No direct mortality during construction predicted due to absence of roosts under alignment. RTA due to operation if bats continue to cross between the wood and along the green corridor to features in the west.	Negligible (construction); medium negative (operation)	Negligible (cpnstruction); Modertae (operation)
				Minimal loss of medium value roost and foraging habitat in south east of habitat area.	Low negative	Minor
				Severance of commuting routes between wood and features to the west of the road including Moss of Auchlea and fragmentation of important wildlife corridor as per S40, S42.	Medium negative (construction); High negative (operation)	Moderate
				Disturbance of foraging activity in south east of Habitat Area due to clearance for construction and operation of road.	Medium negative	Moderate
				Potential pollution of Upper Beanshill Burn due to spills and runoff.	Medium negative	Moderate
S44 Agricultural fields to the west of	Regional	0 – 500m	Construction / Operation	No direct mortality during construction predicted due to absence of roosts under alignment. Direct mortality due to RTAs from severance of commuting routes during operation of the scheme.	Negligible (construction) medium negative	Negligible (construction) Moderate (operation)

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
Kingshill Wood.				Minimal loss of foraging and commuting habitat due to construction and operation.	Low negative	Minor
				Severance and fragmentation of commuting routes between Gairnhill Wood (S43) and features to the west including Moss of Auchlea at the Gairnhill Access, Gairnhill Road and access to Moss of Auchlea.	Medium negative (construction); High negative (operation)	Moderate (construction) Major (operation)
				Disturbance of commuting bats likely during construction and operation of the scheme.	Medium negative	Moderate
				Potential pollution impacts due to spills and runoff from scheme into Silver Burn and Gairn Burn; potential hydrological impacts on Moss of Auchlea as per S45.	Medium negative	Moderate
S45 Moss of Auchlea	Regional	50 – 500m	Construction	No direct mortality predicted during construction due to distance from scheme.	Negligible	Negligible
				No loss of foraging habitat due to distance from scheme during construction.	Negligible	Negligible
				Temporary severance of commuting routes due to insensitive siting of works on commuitng routes between the Moss and Gairnhill Wood.	Medium negative	Moderate
				Disturbance possible during construction due to the proximity of roosts to proposed scheme if works compounds are located nearby.	Medium negative	Moderate
				Potential pollution and habitat modification due to spills into Moss of Auchlea during construction.	Medium negative	Moderate
			Operation	Mortality due to RTA during operation of scheme if bats continue to cross between Moss and roost (potential hibernaculum), and woodland areas.	High negative	Major
				Potential hydrological impacts on the Moss due to position of the road, and subsequent reduction in quality of foraging habitat in medium – long term.	High negative	Major
				Indirect severance of commuting routes between the Moss and roost, and alternative roosts and foraging habitat at Kingshilland Gairnhill Wood to the east of the scheme.	High negative	Major
				Disturbance of roosting, foraging and commuting bats due to light from operational scheme.	Medium negative	Moderate
				Potential pollution and habitat modification due to runoff from scheme into Moss of Auchlea.	Medium negative	Moderate

Section SL6

5.3.40 In Section SL6 there is potential for direct mortality as a result of the construction of the proposed scheme at West Hatton Wood (S47 – County value), the woodland at Fairley Home Farm and Derbeth (N4 – County value) and the woodland shelterbelt east of Hillhead of Derbeth Farm (N7 – County value) where trees with roost potential would be felled. This has been assessed as an impact of medium negative magnitude and Moderate significance. No other habitat areas within section have the potential for direct mortality during construction (impacts of Negligible significance).

5.3.41 Habitat loss of broadleaved and mixed woodland with roost potential and foraging value in this section at West Hatton Wood (S47) and the woodland shelterbelt east of Hillhead of Derbeth Farm (N4) would be predicted to result in impacts of medium negative magntude and Moderate significance. Loss of high value foraging and commuting habitats at the woodland and shelterbelt east of Hillhead of Derbeth Farm (N4) including the pond at Fairley Home Farm, would result in a impact of high negative magnitude and Moderate significance; and loss of scrub and bracken on lower slopes of Brimmond Hill (N8) would be predicted to result in an impact of low negative magnitude and minor significance. The loss of a roost in the shelterbelt to the east of Hillhead of Derbeth Farm (N7) would constitute an impact of high negative magnitude and Moderate significance.

5.3.42 Fragmentation and severance due to the construction of the proposed scheme would be predicted at S46, S47, N2, N3, N4 and N7 as loss of linear commuting routes due to the construction works for the proposed scheme would be likely to have an adverse impact on connectivity throughout the section. Impacts of medium negative magnitude and Moderate significance are predicted for all except N4 where the loss of connectivity would be predicted to result in a change in the ecological function of the area and an impact of high negative magnitude and Moderate significance is predicted

5.3.43 Some disturbance due to construction noise and vibration and alteration to roost entrances and local commuting routes may occur at Cloghill where a bat roost exists close to the proposed scheme, resulting in an impact of medium negative magnitude and Moderate significance. Disturbance of foraging and commuting bats would be an issue if night works were carried out near the higher value roosting, foraging and commuting habitats west of Hatton Woods (S47), Fairley Home Farm (N2) and woodland habitats (N4, N7 and N8), with predicted impacts of low - medium negative magnitude and Minor – Moderate significant on the local bat populations.

5.3.44 During the operation of the road, direct mortality due to collision with moving traffic would be predicted to occur where the scheme crosses minor commuting routes and linear features including tree lines and woodland edges at S46, S47, N3, N4, N7 and N8 resulting in impacts of medium negative magnitude and Moderate significance on the local populations of brown long-eared, pipistrelle and Myotis bats in the area. This would have implications for bats being able to cross the road safely between roosting opportunities in Kingswells and foraging areas to the west of the scheme.

5.3.45 Habitat loss would be an issue (as per construction) where broadleaved and mixed woodland and associated foraging opportunities would be permanently lost at West Hatton Woods (S47) which would result in an impact of medium negative magnitude and Moderate significance ; the pond in Fairley Home Wood would be lost, with impacts of high negative magnitude and Moderate significance on bats if alternative aquatic foraging provision were not made. The loss of shelterbelt habitats and roost in the north of the Section (N7) would result in impacts of high negative magnitude and Moderate significance; the loss of scrub foraging habitat at the edge of Brimmond Hill (N8) would result in an impact of low negative magnitude and Minor significance on the bat populations that use them; reducing the suitability of the local roosting and foraging habitat resource.

5.3.46 As per construction severance and fragmentation of foraging and commuting habitats and flight routes would be predicted to result in impacts of Moderate significant on local bat populations into the operation of the scheme if provision were not made for bats to cross. The severance of

important linear connecting habitat would have an 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.

5.3.47 Disturbance during the operation of the road including junction lighting at the North Kingswells Junction may result in changes in local bat behaviour if they have to change flight paths or if roosts become unsuitable for use as a result of changes in their characteristics. This would be predicted to occur at S46, S47, N2, N4, N7 and N8, resulting in impacts of low - medium negative magnitude and Minor (N8) to Moderate significance on local bat populations.

5.3.48 Pollution would only be predicted as a potential impact at Westholme Burn (S46 – of low negative magnitude and Minor significance) but the absence of watercourses directly under the alignment elsewhere in this section means that pollution events would be unlikely to reduce foraging habitat value during construction or operation.

5.3.49 The potential impacts of the proposed scheme on bat populations in Section SL6 are shown in Table 39 below.

Table 39 – Assessment of Potential Impacts Section SL6

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
S46 Agricultural fields to the north of the A944	Regional	0-500m	Construction/ Operation	No direct mortality during construction predicted due to absence of roosts under alignment.	Negligible	Negligible
				Direct mortality due to RTAs from severance of commuting route along a minor road near Cloghill and roost during operation of the scheme.	Medium negative	Moderate
				Minimal loss of low value foraging and commuting habitat.	Negligible	Negligible
				Severance of minor commuting route along the edge of West Hatton Wood during construction and operation.	Medium negative	Moderate
				Disturbance possible during construction due to the proximity of potential roost (1b) at Cloghill to proposed scheme if works compounds are located nearby. Disturbance of commuting bats likely during construction and operation of road due to severance of commuting route.	Medium negative	Moderate
				Potential pollution impacts due to spills and runoff at Westholme Burn.	Low negative	Minor
S47 West Hatton Woods DWS	County	0-350m	Construction/ Operation	Direct mortality due to felling of potential roost trees West Hatton Wood.	Medium negative	Moderate
				Loss of high value foraging and commuting habitat with medium roost potential due to construction of road.	Medium negative	Moderate
				Severance and fragmentation of high value commuting and foraging habitat.	Medium negative	Moderate
				Disturbance possible during construction due to the proximity of known roost at Home Farm and potential roosts within Hatton Woods to proposed scheme if works compounds are located nearby.	Medium negative	Moderate
				No potential pollution predicted due to absence of watercourses.	Negligible	Negligible
			Operation	Direct mortality due to RTAs from severance of high value foraging and commuting site.	Medium negative	Moderate
				Permanent loss of broadleaved woodland habitat.	Medium negative	Moderate
				Severance and fragmentation of high value commuting and foraging habitat.	Medium negative	Moderate
				Disturbance of flight routes and feeding behaviour during operation due to severance and fragmentation of habitat.	Medium negative	Moderate

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
				No potential pollution predicted due to absence of watercourses.	Negligible	Negligible
S48 Cloghill	Local	0-500m	Construction/ Operation	No direct mortality during construction predicted due to absence of roosts under alignment although one building does have low roost potential (2b).	Negligible	Negligible
				Loss of low value bat habitat.	Negligible	Negligible
				No severance, fragmentation or disturbance predicted due to the low suitability of habitat for bats.	Negligible	Negligible
				No potential pollution predicted due to absence of watercourses.	Negligible	Negligible
N1 Kingswell	County	400-500m	Construction/ Operation	No direct impacts predicted due to distance from scheme.	Negligible	Negligible
N2 Agricultural fields north of Cloghill	Local	50-500m	Construction/ Operation	No direct mortality during construction predicted due to absence of roosts under alignment.	Negligible	Negligible
				No direct loss of habitat due to distance from scheme.	Negligible	Negligible
				Severance and disturbance of commuting route at Fairley Home (assessed in N4) during construction and operation.	Medium Negative	Moderate
				No potential pollution predicted due to absence of watercourses.	Negligible	Negligible
N3 Derbeth Farm and agricultural land around Fairley Home Farm	County	0-500m	Construction/ Operation	No direct mortality during construction predicted due to absence of roosts under alignment. Direct mortality due to RTAs from severance of commuting route in north of habitat site.	Medium negative	Moderate
				Loss of limited value foraging habitat.	Negligible	Negligible
				Severance of commuting routes in north of HA.	Medium negative	Moderate
				No disturbance of roosting bats likely during construction and operation due to distance of roost from road and construction works.	Negligible	Negligible
				No pollution predicted due to absence of watercourses.	Negligible	Negligible
N4 Woodland at Fairley	County	0-400m	Construction	Direct mortality possible during construction if bats are roosting in trees to be felled.	Medium negative	Moderate

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
Home Farm and Derbeth Farm.				Loss of high value foraging and commuting habitat and loss of Fairley Home Farm Pond and associated foraging habitat during construction.	High Negative	Moderate
				Severance and fragmentation of commuting route from known roosts at Fairley Home Farm and tree roosts of importance to myotis, brown long-eared and pipistrelle bats.	High Negative	Moderate
				Disturbance to foraging and roosting bats possible during construction due to the proximity of roosts at Fairley Home Farm to proposed scheme if works compounds are located nearby.	Medium Negative	Moderate
				No pollution predicted due to absence of watercourses.	Negligible	Negligible
			Operation	Direct mortality due to RTAs from severance of commuting route although road is in cutting.	Medium negative	Moderate
				Direct loss of high value foraging and commuting habitat and loss of Fairley Home Farm Pond.	High Negative	Moderate
				Severance and fragmentation of commuting route from known roosts at Fairley Home Farm and tree roosts of importance to myotis bats.	High Negative	Moderate
				Disturbance during operation of the scheme.	Medium Negative	Moderate
				No pollution predicted due to absence of watercourses.	Negligible	Negligible
N6 Woodland west of HIllhead of Derbeth Farm	Local	250-500m	Construction/ Operation	No direct impacts predicted due to distance from scheme.	Negligible	Negligible
N7 Woodland and shelterbelt east of Hillhead of Derbeth Farm	County	0-400m	Construction/ Operation	Potential direct mortality during construction predicted due felling of a tree roost and broadleaved and mixed woodland with roost potential. Direct mortality due to RTAs from severance of commuting route along woodland edge during construction and operation.	High negative	Moderate
				Direct loss of high value foraging and commuting habitat north east of Dykeside, and of roost on shelterbelt.	High negative	Moderate
				Severance and fragmentation of commuting route and high roost potential broadeave woodland.	Medium Negative	Moderate
				Disturbance possible during construction due to the proximity of roosts in woodland to proposed scheme if works compounds are located nearby and disturbance during operation of the scheme.	Medium Negative	Moderate

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
				No pollution predicted due to absence of watercourses.	Negligible	Negligible
N8 Scrub and braken on lower slopes of Brimmond Hill SINS	Local	0-500m	Construction/ Operation	No direct mortality predicted during construction due to absence of roosts under the scheme. RTA risk assessed as per N7.	Negligible	Negligible
				Minimal loss of foraging habitat at the edge of Brimmond Country Park.	Low negative	Minor
				No fragmentation predicted due to road passing eastern edge of the woodland/scrub.	Negligible	Negligible
				Disturbance and disruption of bat activity in woodland area possible due to construction and operation of the road.	Medium negative	Minor
				No pollution predicted due to absence of watercourses.	Negligible	Negligible
N10 Agricultural fields south of C89c Overhills Farm	Less than local	400-500m	Construction/ Operation	No direct impacts predicted due to distance from scheme due to the low value of this site to bats.	Negligible	Negligible

6 Mitigation

6.1 Introduction

6.1.1 This section of the report outlines measures to prevent /avoid, 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 40. 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 /avoid, 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.

Table 40 – Generic Mitigation Measures

Potential Impact	Mitigation Type	Description of Mitigation
Direct mortality	Avoid	Direct mortality to be avoided 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 (Highways Agency, 2001). 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. 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,l 2004) where they are enhanced by guiding or sheltering vegetation or structures along the bridge. 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 of the AWPR Environmental Statement 2007) and sensitive design of road and right of way crossing points to enable bats to use them will be used to minimise the likelihood of bats flying over the road.
	Reduce	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. 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.
	Offset	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 (Highways Agency, 2001). The site specific exclusion methods will be detailed as part of the licence agreement. 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).
Habitat loss	Prevent	Habitat loss will be prevented by removal of trees and buildings only where there is no alternative, and within the minimum area necessary. 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. 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. 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).
	Reduce	Some felled trees will be left in areas of woodland clearance to provide foraging habitat and egg laying habitat for insect prey larvae. 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.

Potential Impact	Mitigation Type	Description of Mitigation
		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). 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. 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.
	Offset	Where older trees and those with suitable crevices would 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 (Highways Agency, 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. Bat boxes will be located according to the following criteria in order to increase the likelihood of bats using them: - Boxes will be sited at least 30m away from the proposed scheme to prevent attracting bats to the road. - 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. - 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. 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 targets in Local and National BAPs for Pipistrelles and Daubenton's bats. 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.

Potential Impact	Mitigation Type	Description of Mitigation
Habitat Fragmentation and Isolation	Prevent	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. The operational scheme will not prevent bats from moving freely within and between available HA's. This includes maintaining connectivity between foraging and roost areas and retention of known flyways. 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.
	Reduce	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. Where possible, woodland rides will be maintained and natural regeneration encouraged in gaps to offset isolation in the long term.
	Offset	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). 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 (Highways Agency, 2001). A crossing monitoring programme will be established to assess its success.
Disturbance	Prevent / Avoid	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 avoid disturbance to bats using these areas. Roosts will be identified to contractors to ensure that they are not accidentally disturbed. Trees to be retained will be safeguarded from damage according to BS 5837 (1991). 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. 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.
	Reduce	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. Night working (between sunset and sunrise) will be avoided near to roosts to avoid alterating of bat emergence and social behaviour. 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.

Potential Impact	Mitigation Type	Description of Mitigation
	Offset	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). 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).
Pollution	Prevent / Avoid	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. PPG 1 – General guide to prevention of water pollution PPG 3 – Use and design of oil separators PPG 5 – works in, near or liable to affect watercourses PPG 6 – Working at construction and demolition sites PPG 21 – Pollution Incident Response Planning Details regarding pollution control can be found in the Otter Report (Appendix A25.5) and Freshwater Ecology report (Appendix A25.9) 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.
	Reduce	Levels of dust will be minimised so that this does not build up significantly on trees and scrub vegetation.

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:

- minimising the risk 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) in advance of development commencing. 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 minimise the risk of 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 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 this buffer zone, the size of which will be determined by the roost characteristics and situation.
- ensuring that trees that are to be retained must be safeguarded from damage in accordance with the guidance provided in BS 5837 (2005);
- 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 in proximity to known roosts without 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 the removal of roosts 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 activities required, 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;
- 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.

Specific Mitigation Section SL1

6.3.6 Specific areas of habitat creation in this section which will be of benefit to bats and will offset the loss of valuable habitats include the relocation of Greenhowe Quarry pond within the woodland to mitigate against the loss of foraging habitat. Various areas of scrub, riparian woodland, mixed and broadleaved woodland will be provided to mitigate for loss of habitat (see also Chapter 26 of the AWPR Environmental Statement 2007).

6.3.7 The following safe crossing points will be provided for bats enabling safe crossings across the scheme:

- culverts at Lorston Burn (ch205580) and at Burn of Ardoe (ch203030);
- Hatton Overbridge (ch206350) will be enhanced with scrub and mixed woodland as per Landscape Report (Chapter 26) to encourage use by bats; and
- scrub to integrate the bridge at Duff's Hill Accommodation Overbridge (ch204620) and provide screening of the AWPR to encourage the usage of the bridge to bats;

6.3.8 The impacts of pollution and disturbance will be mitigated by generic mitigation measures including sensitive location of site access roads and compounds, no night works and best practice.

6.3.9 The specific mitigation proposals for Section SL1 are shown in Table 41 below.

Table 41 – Specific Mitigation Proposals Section SL1

Habitat Area	Impact Magnitude /Significance	Mitigation Measures
S1 Hatton Wood	No direct impacts predicted. (Negligible / Negligible)	No specific mitigation required.
S2 Agricultural fields east of the A90	Disturbance possible during construction due to proximity of roosts to proposed scheme (Medium negative / Moderate). Potential potential due to spills during construction and operation (Medium negative/Moderate)	Disturbance will be reduced by sensitive location of site access roads, compounds and plant during construction, with vibration and noise kept to a minimum within 50m of roost during breeding and hibernating period. There will be no night works during construction. Generic mitigation will reduce the risk of pollution during construction and operation.
S3 Wood/scrub mosaic east of Greenhowe	RTA during operation (low negative/Minor) Habitat loss due to construction (High negative/Minor). Habitat fragmentation and severance of commuting routes during construction (Medium negative/Minor). Disturbance due to construction (High negative/Minor).	RTA will be partly prevented by provision of a safe crossing as below and presence of the road in a cutting. Creation of a replacement pond will offset loss of Greenhowe Pond and mitigate against the loss of foraging habitat. The existing wet woodland will be retained with additional riparian planting added. Additional broadleaved and mixed woodland will be planted to offset habitat loss (for additional information see Chapter 26 of the AWPR Environmental Statement, 2007). Severance of commuting route due to operation will be prevented by retention of the commuting route through provision of a safe crossing point at Hatton Overbridge which will partly offset severance by providing a safe crossing point, although the route will not connect with habitats on the north of the road. Disturbance will be reduced by sensitive location of site access roads, compounds and plant during construction, with vibration and noise kept to a minimum within 50m of roost during breeding and hibernating period. There will be no night works during construction.
S4 Bog south of Greenhowe	No direct impacts predicted (Negligible/Negligible).	No specific mitigation required.
S5 Agricultural fields south of Greenhowe	No direct impacts predicted (Negligible/Negligible).	No specific mitigation required.
S6 Greenhowe	Loss of foraging habitat due to construction and operation (Low negative/Minor)	No planting proposed to replace habitat lost. Landscape planting may provide some foraging habitat.
	Severance and fragmentation of foraging habitat due to construction and operation of road (Medium negative/Minor).	Disturbance of foraging and roosting bats during construction will be reduced by limiting works to daytime only. Severance during construction will be reduced by keeping flyways open at night. Culvert at Loirston Burn (ch205580) may provide safe crossing point for by bats during operation. Crossing points will be monitored to ensure use by bats. Mixed woodland planted alongside the AWPR (see Chapter 26 of the AWPR Environmental Statement) will provide a linear feature along which bats may commute to safe crossing points at Hatton Accommodation Overbridge.

Habitat Area	Impact Magnitude /Significance	Mitigation Measures
	Disturbance of foraging and commuting bats due to construction (Low negative/Minor).	Disturbance will be reduced by sensitive location of site access roads, compounds and plant during construction, with vibration and noise kept to a minimum and no night works during construction. Where possible flyways will be created to encourage bats to continue to use current commuting pathways during construction.
S7 Duff's Hill	No significant direct impacts (Negligible/Negligible).	No specific mitigation required.
S8 Agricultural fields west of Duff's Hill	No significant direct impacts (Negligible/Negligible).	No specific mitigation required.
S9 Wood west of Greenhowe	Possible RTAs during operation due to severance of commuting habitat (Medium negative/Moderate) Severance of commuting routes (Medium negative/Moderate). Disturbance of commuting route during operation (Medium negative/Moderate).	Severance of commuting routes will be reduced by sensitive location of site access roads, compounds and plant during construction, with vibration and noise kept to a minimum within 50m of roosts during breeding and hibernating period. There will be no night works during construction. Where possible flyways will be created to encourage bats to continue to use current commuting pathways during construction. Duffshill Accommodation Overdridge will provide connectivity between the north and south of the scheme and will be enhanced with scrub woodland planting to encourage use by bats (see Chapter 26 of the AWPR Environmental Statement 2007) and to encourage the usage of the bridge by bats to minimise the risk of RTAs. However the bridge will be slightly offset from the commuting route at Causey Maunth Road. Disturbance of foraging and roosting bats during construction will be reduced by limiting works to daytime only.
S10 Hare Moss	Habitat loss and hydrological impacts due to construction (Medium negative/Moderate). Disturbance to foraging behaviour during construction and operation (Low negative/Minor). Pollution due to spills during construction and operation (Medium negative/Moderate).	No planting will be undertaken as this would alter the delicate hydrological balance in the Moss. The impacts of pollution will be mitigated by generic mitigation measures including sensitive location of site access roads and compounds and best practice. Hydrological impacts will be addressed by measures described in Appendix A24.1 of the AWPR Environmental Statement 2007. There would be no overall loss of foraging habitat quality and no fragmentation due to the road passing to the south of the moss. The proposed detention ponds are located far enough away from the moss for impacts to be negligible. Disturbance will be reduced by sensitive location of site access roads, compounds and plant during construction, with vibration and noise kept to a minimum within 50m of roost during breeding and hibernating period. There will be no night works during construction. Where possible flyways will be created to encourage bats to continue to use current commuting pathways during construction. The culvert at Burn of Ardoe (ch 203030) will provide safe crossing point for use by bats during operation of the scheme. Generic mitigation will minimise the risk of pollution during construction and operation.

Specific Mitigation – Section SL2

6.3.10 Various areas of scrub, riparian woodland, mixed and broadleaved woodland will be provided to mitigate for loss habitat (See Chapter 26 of the AWPR Environmental Statement 2007).

6.3.11 The following safe crossing points will be provided for bats enabling safe crossings and connectivity between habitats across the scheme.

- Culverts at Heathfield Burn (ch203650), Burn of Arode (ch204040), Bishopston Ditch (ch203900), Lorston Burn (ch205580), Whitestone Burn (ch200990) and a dry mammal underpass will provide safe crossing point for bats during operation of the scheme.
- Scrub will be planted to integrate the Duff''s Hill Accomodation Overbridge, mixed woodland and scrub will be planted at overbridge (ch202000) and mixed woodland at the bridge which is by Burnside which would provide screening of the AWPR to encourage the usage of the bridges to bats.
- Scrub planting at U59K Bishopston Accommodation Overbridge (ch203150) will be shaped in such a way as to direct bats over the road safely along the road. Broadleaved woodland planting next to Bishopston will also act as a screen to reduce direct road crossings at this point.
- Linear standard tree planting along the C30K will enhance the commuting route at Merchant's croft and the Merchant's Croft Overbridge (ch202070) will provide a safe crossing point over the scheme between Clochandighter and Shanna Burn Wood.
- Mixed woodland planting either side of the S5K overbridge at Burnhead (ch200630) will improve the chances of this route being used safely by bats.

6.3.12 The impacts of pollution and disturbance will be mitigated by generic mitigation measures including sensitive location of site access roads and compounds, no night works and best practice.

6.3.13 The specific mitigation proposals for Section SL2 are shown in Table 42 below.

Table 42 – Specific Mitigation Proposals Section SL2

Habitat Area	Impact Magnitude /Significance	Mitigation Measures
S11 North of Sunnyside	No direct impacts as woodland to be retained (Negligible/ Negligible).	No specific mitigation required.
S12 Greenloaning Wood	No direct impacts due to the distance from proposed scheme (Negligible/ Negligible).	No specific mitigation required.
S13 Agricultural fields around Sunnyside to Causeyport	Severance of commuting routes due to proposed road (Medium negative /Minor).	Severance of commuting routes will be reduced by sensitive location of site access roads, compounds and plant during construction, with vibration and noise kept to a minimum within 50m of roosts during breeding and hibernating period. There will be no night works during construction. Where possible flyways will be created to encourage bats to continue to use current commuting pathways during construction. Scrub will be planted to integrate the Duffshill Accomodation Overbridge and screen the road corridor (see Landscape Report Chapter 20) and mixed woodland and scrub to encourage usage of bridges by bats for commuting between habitat areas and reduce the effects of severance during the operation of the road. Similarly Bishopston Accommodation Overbridge will be planted with mixed woodland either side of the road and will be shaped to encourage use by bats. Broadleaved woodland planting adjacent to Bishopston will provide a screen to reduce the probablility of direct crossings further enhancing the crossing point at Bishopston Accommodation Overbridge. Culverts at Healthfield Burn (ch203650), Burn of Ardoe (ch 204040) and Bishopton Ditch (ch203900) may also provide additional crossing point for use by bats during operation. Generic measures will reduce disturbance during construction and operation.
	Disturbance and fragmentation of commuting routes during construction and operation of scheme (Low negative/Minor).	
S14 Clochandighter Wood	Indrect fragmentation of foraging habitat and roosting sites during operation of scheme (Medium negative /Minor).	Severance of commuting routes will be reduced by sensitive location of site access roads, compounds and plant during construction, with vibration and noise kept to a minimum within 50m of roosts during breeding and hibernating period. There will be no night works during construction. Where possible flyways will be created to encourage bats to continue to use current commuting pathways during construction. No specific mitigation will be provided for this habitat area however mixed woodland and scrub land planting which will integrate the bridge (ch202000) and standard trees will be planted to facilitate connectivity for bats (S16) between habitat areas.
S15 Whitestone Wood and Hill of Blairs	Indirect fragmentation of foraging habitat and roosting sites during the operation of the scheme (Medium negative /Moderate)	Severance of commuting routes will be reduced by sensitive location of site access roads, compounds and plant during construction, with vibration and noise kept to a minimum within 50m of roosts during breeding and hibernating period. There will be no night works during construction. Where possible flyways will be created to encourage bats to continue to use current commuting pathways during construction. The above crossing points will reduce the effects of severance by providing safe crossing pointes over the road and mixed woodland and scrub land planting which will integrate the bridge (ch202000) and standard trees will be planted to facilitate connectivity for bats between habitat areas (S13 and S16).
S16 Agricultural fields to the east of Burnhead to Greenloaninf	Direct mortality due to demolistion of potential roosts during construction (Medium negative/Moderate).	Felling and demolition must be carried out by experienced contractors and under the supervision of licensed bat workers. Trees with roost potential must 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 must 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.
	Direct mortality due to RTAs during operation of the scheme (High negative/moderate).	Mitigation measures to be implemented for S13 will reduce the probablility RTA in the east of this Habitat Area and provision of safe crossing points at C30K Merchants Croft Overbridge which will be enhanced with standard tree planting to facilitate connectivity; and a safe crossing point at the C5K Overbridge which will also be enhanced with mixed woodland planting, will further reduce the risk of operational RTA.

Habitat Area	Impact Magnitude /Significance	Mitigation Measures
	Habitat loss due to construction of scheme (Medium negative/ Moderate).	No planting proposed to replace lost habitat.
	Severance and fragmentation of foraging and roosting habitat during construction and operation of the scheme (High negative /Moderate).	Severance of commuting routes will be reduced by sensitive location of site access roads, compounds and plant during construction, with vibration and noise kept to a minimum within 50m of roosts during breeding and hibernating period. There will be no night works during construction. Where possible flyways will be created to encourage bats to continue to use current commuting pathways during construction. The above culverts and overbridges will reduce severance and fragmentation issues during the operation of the road although there will be long distances between crossing points.
	Disturbance of foraging and commuting behaviour during construction and operation of the scheme (Medium negative/ Moderate).	
	Potential pollution during construction and operation of scheme (Low negative/ Minor).	Generic mitigation will minimise the risk of pollution during construction and operation.

Specific Mitigation Section SL3

6.3.14 The risk of direct mortality will be minimised by generic measures including pre-works surveys and licence applications, limiting construction to the minimum possible area and reducing disturbance to adjacent trees and buildings during construction works. During operation, safe crossing points will be provided at the following locations:

- Blaikiewell Burn buried structure (ch100150);
- U63K Blaikiewell Road Underbridge (ch100300);
- Wildlife Overbridge in Cleanhill Wood (ch100600);
- Kingcausie/Eastland Accommodation Underbridge (ch101050);
- Box culvert at Kingcausie Burn (ch101470);
- River Dee crossing (ch102000); and
- Milltimber Brae Overbridge (ch102940).

6.3.15 These structures will have suitable dimensions to allow bats to fly through/over them, thus retaining connectivity and in addition many will be planted up with suitable woodland, standard tree and scrub vegetation in such a way to enhance the chances of being found and used by bats. The Kingcausie and Eastland structure would also include bat bricks and chimneys to provide roosting opportunities.

6.3.16 Habitat creation will be undertaken alongside the scheme in Cleanhill Wood to offset habitat lost to the road, and bat boxes (schwegler woodcrete and wooden boxes suitable for all five of the commonly recorded bat species in Aberdeen) will be erected in trees to be retained either side of the scheme in Cleanhill Wood, Kingcausie and along the banks of the Dee.

6.3.17 Disturbance will be reduced with screening to protect roosts where necessary during construction, and planting during operation; and generic measures such as no night working and limiting works to the minimal possible area.

6.3.18 Pollution risk will be minimised by generic measures which include provision of detention basins at Cleanhill Junction and south of Milltimber, as well as keeping works away from the SAC boundary at the River Dee.

6.3.19 The specific mitigation proposals for Section SL3 are shown in Table 43 below.

Table 43 – Specific Mitigation Proposals Section SL3

Habitat Area	Impact Magnitude /Significance	Mitigation Measures
S17 Agricultural fields south of Cleanhill Wood	No direct mortality, habitat loss, disturbance, pollution (negligible/Negligible). Indirect severance (medium negative/Modderate).	Indirect severance will be mitigated as per S16.
S18 Durris Forest	No direct impacts (negligible/Negligible).	No additional mitigation measures required. Bats may benefit from mitigation to be provided in adjacent HA's.
S19 Blaikiewell Farm	No direct mortality, habitat loss, pollution (negligible/Negligible). Fragmentation due to construction and operation (Medium negative/Minor). Disturbance due to junction construction (Low negative/Minor).	No additional mitigation measures required. Bats may be able to use culvert at Burnhead Burn and the buried structure and bridge at Blaikiewell Burn to cross the scheme.
S20 Cleanhill Wood	Direct mortality due to construction and RTA during operation (High negative/Moderate). Habitat loss due to construction (Medium negative/Moderate). Habitat loss due to operation (High negative/Moderate). Fragmentation due to construction and operation (high negative/Moderate). Disturbance due to construction and operation (Medium negative/Moderate).	Generic mitigation measures will minimise the risk of direct mortality during tree felling for construction. RTA and fragmentation during operation will be reduced by the road being in a cutting through the wood, and further reduced by provision of safe crossing points at the Blaikiewell Burn Underbridge (ch100150) and the U63K Blaikiewell Road underbridge (ch100300) which will both be planted with scrub, riparian woodland and standard trees to encourage use by bats; wildlife overbridge at ch100600 in the middle of Cleanhill Wood and planted with scrub to encourage its use by bats; and Eastland Kingcausie Accommodation Underpass at ch101050 which will also be enhanced by habitat creation of mixed woodland and extra heavy standard trees linked into the existing planting. Habitat loss during construction will be limited to the minimum area needed for construction activities; will be offset by habitat creation including broadleaved woodland and scrub planting in Cleanhill Wood adjacent to the road to replace lost vegetation; in addition bat boxes (wooden and Schwegler suitable for all five species of bats commonly seen in Aberdeen) will be erected around Cleanhill Wood and Kingcausie away from the road to provide alternative roosts. Disturbance will be reduced by generic measures including survey prior to tree felling to ensure no roosts will be disturbed.
S21 Agricultural fields below Parkhead	No impacts due to construction or operation (negligible/Negligible).	No additional mitigation measures required.
S22 Floodplain and immediate surrounds of Crynoch Burn (north) and Blaikiewell Burn	Direct mortality due to construction (high negative/Moderate). Habitat loss due to construction and operation (medium negative/Moderate). Fragmentation due to construction (medium negative/Moderate). Disturbance due to construction and	Generic mitigation measures including pre-construction survey, licence application and safeguarding adjacent trees will minimise the risk mortality. During operation, the risk of mortality due to RTA and fragmentation will be minimised by provision of a buried structure at Blaikiewell Burn (ch100150) and the U63K Blaikiewell Road underbridge which will be enhanced by habitat creation as below to direct bats safely across the road. Habitat loss will be reduced by limiting felling and clearing to minimum area necessary for works; operational habitat loss will be offset by the measures described above for S20 including scrub and riparian woodland and standard tree planting

Habitat Area	Impact Magnitude /Significance	Mitigation Measures
	operation (medium negative/Moderate). Pollution due to construction and operation (medium negative/Moderate).	around Blaikiewell Underbridge and bat box provision as per S20 above. Fragmentation due to construction will be reduced by keeping a flyway open incluing using temporary commuting structures if necessary. Disturbance due to construction will be reduced by generic mitigation meastures; habitat creation as above will reduce disturbance and there will be no lighting at the junction. Generic mitigation measures including provision of detention basins will minimise the risk of pollution.
S23 Agricultural fields within Kingcausie	Direct mortality due to RTA (high negative/Major). Fragmentation due to construction and operation (medium negative/Moderate). Disturbance due to construction and operation (high negative/Major).	Direct mortality and fragmentation near a roost will be reduced by provision of a safe crossing point at Kingcausie/Eastland Accommodation Underpass (ch101050) which will be enhanced on both sides with mixed woodland and extra heavy standard trees to link into existing planting. Roost opportunities (bat bricks and chimney) will be incorporated into the crossing to provide alternative roost locations and encourage bats to fly through the structure. Traffic numbers are low enough on the estate road that RTA from newly created roost opportunities will not be an issue. Disturbance during construction will be reduced by undertaking works at a suitable time of year outside the most vulnerable times and by sensitive location of compounds and site accesses. Disturbance during operation will be reduced by mixed woodland and extra heavy tree planting along the western side of the AWPR to screen houses from the road as per Chapter 26 of the AWPR Environmental Statement 2007.
S24 Kingcausie	Direct mortality due to construction and RTA (High negative/Major). Habitat loss due to construction (medium negative/Moderate). Habitat loss due to operation (high negative/Major). Fragmentation and isolation due to construction and operation (high negative/Major). Disturbance due to construction and operation (medium negative/Moderate). Pollution due to construction and operation (medium negative/Moderate).	Generic mitigation measures including pre-construction survey, licence application and safeguarding adjacent trees will minimise the risk of mortality due to felling. The risk of operational mortality due to RTA and fragmentation will be minimised by provision of a safe crossing point at Kingcausie/Eastland Accommodation Underpass (ch101050) as per S23 above, and bats may also use Kingcausie Burn Culvert (ch101470) to cross the scheme. The River Dee Crossing at South Deeside Road will also provide a crossing point as per S27. Extra heavy tree planting either side of the proposed scheme will direct bats along the road and toward safe crossing points. Habitat loss will be reduced by limiting felling and clearing to minimum area necessary for works; during operation the above habitat creation including standard heavy tree planting, bat box provision throughout Cleanhill Wood and Kingcausie as per S20 above, and mixed woodland, broadleaved woodland and extra heavy standard trees as per the Landscape Report Chapter 20. The recreation of Kingcausie Pond in the adjacent Habitat Area will also offset the loss of this foraging resource. Fragmentation of high quality woodland habitats will be reduced by keeping flyways open alogn woodland edges and linear features during construction. The above mitigation to minimise the risk of RTA will reduce the effects of fragmentation and severance during operation. Disturbance will be reduced by generic mitigation measures during construction including pre-work survey and safeguarding trees to be left; screening as per habitat creation and landscaping above will reduce disturbance to existing roosts dueing operation. Pollution risk will be minimised by generic measures including sensitive design of Kingcausie Burn realignment.
S25 Caravan Park	No impacts (negligible/Negligible).	No additional mitigation measures required.
S26 Old Mill Inn and agricultural field surrounds	No impacts (negligible/Negligible).	No additional mitigation measures required.
S27	Direct mortality due to construction (high	Generic mitigation measures including pre-construction survey, licence application and safeguarding adjacent trees will

Habitat Area	Impact Magnitude /Significance	Mitigation Measures
Agricultural fields south of the River Dee	negative/Moderate). Habitat loss due to construction and operation (low negative/Minor). Severance of B9077 commuting route during construction of Dee Crossing (medium negative/Moderate). Disturbance due to construction and operation (low negative/Minor).	minimise the risk of mortality during felling. Habitat loss will be offset by provision of bat boxes in trees to be retained along the banks of the River Dee and in Kingcausie and Cleanhill Wood as per S20/S24 with no overall loss of roost opportunities. Communting route severance during construction of bridge will be minimised by keeping flyways open and reducing disturbance. Disturbance will be reduced by generic mitigation measures.
S28 Floodplain and immediate surrounds of the River Dee	Habitat loss due to construction and operation (low negative/Minor) Severance due to construction (high negative/Major). Disturbance due to construction and operation (medium negative/Moderate). Pollution of the River Dee due to construction and operation (high negative/Major).	The River Dee Crossing (ch102000) will be high enough that fragmentation and direct mortality due to traffic collisions will not be a significant issue during operation. Habitat loss will be offset by provision of bat boxes in trees to be retained along the banks of the River Dee and in Kingcausie and Cleanhill Wood as per S20/S24 with no overall loss of roost opportunities. Commuting route severance during construction will be minimised by keeping a flyway open during bridge construction and minimising disturbance so bats are not deterred from the river. Generic mitigation including no night works and provision of barriers to prevent light spilling onto the river and banks will reduce disturbance. Generic mitigation and establishment of no-working zone in the SAC boundary will reduce likelihood of pollution during construction; provision of detention basins to treat runoff will prevent pollution during operation.
S29 Agricultural fields south of Milltimber	Pollution of Milltimber Burn due to construction and operation (medium negative/Moderate).	Generic mitigation and provision of detention basins to treat runoff will reduce likelihood of pollution and provide additional foraging habitat during operation.
S30 Camphill School	No impacts predicted (negligible/Negligible).	No additional mitigation measures required.
S31 Deeside Old Railway Line	Direct mortality due to RTA (high negative/Moderate). Habitat loss due to construction and operation (medium negative/Moderate) Fragmentation of commuring route due to construction and operation (high negative/Moderate). Disturbance due to construction and operation (medium negative/Moderate).	The risk of direct mortality and fragmentation will be partially addressed by provision of a new crossing point over the scheme (Milltimber Brae Overbridge), however this would not be aligned with the rest of the commuting route so bats may still attempt to cross. Planting of mixed woodland between the scheme and the Old Deeside Line as per Chapter 26 of the AWPR Environmental Statement 2007 will force bats to fly up and over the road or seek alternative routes. Mixed woodland planting around detention basins will provide alternative foraging habitat to offset that lost to the scheme. Disturbance will be reduced using generic mitigation including no night works and imiting habitat loss to the minimum area necessary.

Specific Mitigation Section SL4

6.3.20 The risk of direct mortality will be minimised by generic measures including pre-works surveys and licence applications, limiting construction to the minimum possible area and at a suitable time of year, and reducing disturbance to adjacent trees and buildings during construction works. In addition a mitigation method statement will be designed for the demolition of the International School and the brown long-eared and pipistrelle bat roosts it contains. During operation, safe crossing points will be provided at the following locations:

- A93 Overbridge (ch102990);
- Milltimber Junction Overbridge (ch104000); and
- Contlaw Road Overbridge (ch104770).

6.3.21 These structures will have suitable dimensions to allow bats to fly through/over them, thus retaining connectivity and in addition many will be planted up with suitable woodland, standard tree and scrub vegetation in such a way to enhance the chances of being found and used by bats.

6.3.22 Habitat creation will be undertaken alongside the scheme in Milltimber to offset habitat lost to the road, and heated bat boxes and a bat house to replace the maternity roost lost at the International School will be installed in adjacent areas close to the scheme in advance of demolition to give bats time to find them.

6.3.23 Disturbance will be reduced with screening to protect roosts where necessary during construction, and planting during operation; and generic measures such as no night working and limiting works to the minimal possible area.

6.3.24 The specific mitigation proposals for Section SL4 are shown in Table 44 below.

Table 44 – Specific Mitigation Proposals Section SL4

Habitat Area	Impact Magnitude /Significance	Mitigation Measures
S32 East Peterculter and western Milltimber	Direct mortality due to construction and operation (high negative/Major) Habitat and roost loss due to construction and operation (high negative/Major). Fragmentation due to construction and operation (medium negative/Moderate Disturbance due to construction (medium negative/Moderate) Disturbance due to operation (low negative/Minor).	The risk of direct mortality during construction will be minimised by undertaking pre-work survey and applying for a licence to carry out demolition during a time of the year when nursing and hibernating bats are not present (ie in spring or autumn). Bats will be excluded from the roost prior to demolition using one-way 'gates' and a bat worker will be present on site to remove any bats that persist and to release them close by at night. During operation the presence of the road in a cutting at this location and the provision of safe crossing points will reduce RTA risk as below for fragmentation. Loss of the large roost will be offset by provision of a bat house seeded with droppings and using timber and other features from the existing roost in the International School to enhance chances of bats finding and accepting the new roost. The building must be available prior to demolition and will be situated as close as possible to the existing site. In addition heated bat boxes will be affixed onto nearby buildings on both sides of the scheme as a short to medium term solution to roost loss, by landowner agreement. New roosts will be monitored for 2 years post-construction. Fragmentation will be addressed by keeping commuting features open during construction and by provision of safe crossing points over the cheme at Milltimber Brae Overbridge (ch102670), the North Deeside Road (A93) Overbridge (ch102990) and Milltimber Junction Overbridge (ch104000). Extra heavy standard tree planting either side of the scheme and barriers/tree planting either side of the road will direct bats toward safe crossing points and reduce the risk of mortality from direct road crossings. Disturbance during construction will be reduced by carrying out a survey of adjacent buildings to identify roosts and providing temporary screens where necessary to reduce noise, vibration and light. No night working will be undertaken. During operation generic mitigation and the above measures including tree and mixed woodland planting will screen buildings and associated roosts from operational disturbance and lighting at the junctions will be kept to a minimum.
S33 Milltimber	Direct mortality due to construction and RTA during operation (medium negative/Moderate). Habitat and potential roost loss due to construction and operation (low negative/Minor). Fragmentation due to construction and operation (medium negative/Moderate).	The risk of direct mortality will be minimised by generic mitigation including pre-works survey, licence application and exclusion and where necessary replacement roost and safe crossing point provision as per S32. Habitat loss will be offset by replacement roost provision and planting in Milltimber as per S32. Fragmentation during construction and operation will be reduced in the same way as for S32 including provision of safe crossing points and linear planting alongside the road to direct bats to crossings and not over the cutting. Disturbance during construction and operation will be reduced as per S32 above including screening and reduction of lighting.
S34 Guttrie Hill	RTA and ndirect fragmentation due to construction and operation (medium negative/Moderate).	Commuting routes along Culter House Road will not be replaced but linear planting of mixed woodland and extra heavy standard trere planting either side of the proposed road will direct bats north and south along the cutting to alternative crossing points at the A93 Overbridge (ch102990) and Milltimber Junction (ch104000) which will both be planted up on either side as per landscape report in Chapter 26 which bats may use to cross between foraging and roosting resources either side of the road. The road would be in a cutting, reducing its attractiveness to bats.
S35 Milltimber Wood	RTA and ndirect fragmentation due to construction and operation (medium negative/Moderate).	The mitigation measures described for S34 will partly offset habitat fragmentation between Milltimber and Guttrie Hill Woods.
S36 Agricultural fields around Nether Beanshill	No impacts predicted (Negligible / Negligible).	Generic mitigation and mitigation measures for adjacent HA's will reduce impacts on bats.

Habitat Area	Impact Magnitude /Significance	Mitigation Measures
S37 Woodland from Hill Farm to Westfield Lodge	Habitat loss due to construction and operation (low negative/Minor). Severance and fragmentation due to construction and operation (medium negative/Moderate).	Loss of potential roosting and foraging habitat in the woodland area around Beanshill House will be offset by bat box provision in trees to be retained and mixed woodland planting either side of the road with no overall loss in foraging opportunities. Severance and fragmentation will be addressed by keeping flyways open during construction and by provision of safe crossing points at Contlaw Road Overbridge (ch104770) which will be enhanced by planting including extra heavy standard tree planting either side of the road to encourage its use by bats. RTA is unlikely to be an issue here due to the road being in a cutting and the provision of the safe crossing point and the absence of east-west commuting resources elsewhere in the vicinity.
S38 Improved fields	Direct mortality due to RTA during operation (low negative/Minor). Fragmentation and severance during operation (low negative/Minor).	Alternative commuting routes to Beans Hill and foraging areas will be provided north south alongside the road where mixed woodland and scrub planting will create a linear navigation feature and connect with safe crossing to be provided at Contlaw Road as per S37. The road will be in a cutting, reducing the RTA risk by deterring bats from flying across.
S39 Beans Hill	Indirect severance due to operation (low negative/Minor).	Mitigation to be provided as per S38 will reduce impacts on bats using this HA.

Specific Mitigation Section SL5

6.3.25 The risk of direct mortality will be minimised by generic measures including pre-works surveys and licence applications, limiting construction to the minimum possible area and soft felling methods to remove trees with roost potential. During operation of the road safe crossing points will be provided at the following locations:

- Beanshill Accommodation Underpass (ch105970);
- C127K Silverburn Road Underpass (ch106500);
- Gairn Farm Accommodation Underpass (ch107300); and
- Culvert at Moss of Auchlea (ch107440).

6.3.26 Scrub planting either side of Beanshill accommodation underpass; scrub and linear planting either side of the road leading up to the Silverburn Road crossing on the embankment and linear planting of standard trees to create a new commuting route between Moss of Auchlea and Kingshill Wood will reduce the risk of RTA, especially if bats are discouraged from flying directly over the road by no trees being planted within 10m of the road.

6.3.27 The retention and maintenance of these crossing points will reduce the effects of severance and fragmentation by maintaining connectivity between the east and west of the road.

6.3.28 Habitat loss will be minimised during construction and will be offset by habitat creation including linear mixed woodland planting either side of the proposed scheme near Gairnhill Wood and bats may also benefit from planting of riparian scrub around the detention basins at Beanshill Accommodation Underpass.

6.3.29 Disturbance will be reduced by generic measures including pre-works surveys and temporary screening and no night works during construction, and by planting which will act as screening in the operation of the road.

6.3.30 The risk of pollution will be minimised by generic measures including provision of detention basins and SUDS.

6.3.31 The specific mitigation proposals for Section SL5 are shown in Table 45 below.

Table 45 – Specific Mitigation Proposals Section SL5

Habitat Area	Impact Magnitude /Significance	Mitigation Measures
S40 Agricultural fields around Silver Burn	Direct mortality due to RTA (high negative./Major). Habitat loss due to construction and operation (medium negative/Moderate). Severance due to construction and operation (medium negative/Moderate). Disturbance due to construction and operation (medium negative/Moderate). Pollution of Silver, Gairn and Ord Burns due to construction and operation (medium negative/Moderate).	Risk of RTA risk and severance of commuting route along Silverburn Road will be minimised by provision of a safe crossing at the C127Silverburn Underbridge (ch106500) which will be high enougo for bats to fly underneath and which is located at the same location as the existing route so bats will become accustomed to the new layout when vegetation either side of the road has matured. Bats may also benefit from the provision of a safe crossing at Gairnhill Accommodation Underpass (cg105970) which will be planted up on either side with scrub to enhance chances of bats finding and using it. Planting alongside the embankment will minimise the likelihood of direct crossings or force bats to fly high over the carriageway. Habitat loss will be minimised during construction by reducing activity to the minimum possible area and sensitive location of compounds etc in the lower value agricultural areas away from the higher value woodland and shelterbelt habitats. During operation linear planting of broadleaved and mixed woodland either side of the road as per S43 will offset loss of foraging habitat, and detention basins with riparian woodland edges may create a foraging resource to the west of the road in an area currently scarce in foraging opportunities. Risk of severance during construction will be minimised by keeping the flyway open along the Silverburn Road and no barriers to be put in the way of commuting. Disturbance of roosting habitat will be reduced by generic mitigation measures including screening and sensitive siting of construction compounds and access roads during construction. Linear mixed woodland planting alongside the proposed scheme will reduce light impacts on the roost during operation Pollution risk will be minimised by generic mitigation including provision of detention basins.
S41 Silver Burn Wood	Indirect severance (medium negative/Moderate).	Severance issues will be addressed as per S40 and S42.
S42 East Silver Burn	Direct mortality due to RTA (high negative/Major) Habitat loss due to construction and operation (medium negative/Moderate). Severance of commuting route (medium negative/Moderate). Disturbance of roosting and foraging/commuting routes due to construction and operation (medium negative/Moderate). Pollution of Gairn Burn and Upper Beanshill Burn due to construction and operation (medium negative/Moderate).	Direct mortality and severance will be mitigated by provision of safe crossing point enhanced with planting at the C127 Silverburn Road Underbridge (ch106500) as per S40 above. Loss of part of Rotten O'Gairn DWS will be offset by riparian scrub woodland planting to the west of the scheme. Bats will also benefit from planting either side of the scheme as per S40/S43. Disturbance will be reduced by generic measures including pre-construction survey at roosts and safeguarding of adjacent trees and no night works. Disturbance during operation will be reduced by linear planting of woodland habitat alongside the road which will screen existing roosts and foraging areas from operational disturbance. Pollution risk will be minimised by generic measures including the provision of detention basins.

Habitat Area	Impact Magnitude /Significance	Mitigation Measures
S43 Gairnhill and Kingshill Wood	Habitat loss due to construction and operation (low negative/Minor) Severance due to construction and operation (medium - high negative/Moderate). Disturbance due to construction and operation (medium negative/Moderate). Pollution of Upper Beanshill Burn due to construction and operation (medium negative/Moderate).	Habitat loss will be reduced by minimising area of works during construction and by habitat creation including broadleaved woodland planting and linear mixed woodland planting either side of the scheme during operation. This will provide alternative foraging habitat in the long term and extend the existing woodland. Risk of severance of commuting route and fragmentation of green corridor will be minimised by keeping the flyway open during construction and by provision of safe crossing points at Gairnhill Accommodation Underpass and C127 Silverburn Road Underbridge as per S40/S42. Disturbance will be reduced by minimising construction activity to minimal possible area, safeguarding roosts after pre-construction survey, and no night works. During operation the above measures including linear planting either side of the scheme will reduce light and noise disturbance at woodland edges Pollution risk will be minimised by generic mitigation measures including provision of detention basins.
S44 Agricultural fields to the west of Kingshill Wood.	Direct mortality due to RTA (medium negative/Moderate) Habitat loss due to construction and operation (low negative/Minor). Severance and fragmentation due to construction (medium negative/Moderate) and operation (high negative/Major). Disturbance due to construction and operation (medium negative/Moderate). Pollution of Gairn and Silver Burns due to spills and runoff (medium negative/Moderate).	Risk of direct mortality and severance during operation will be minimised by provision of safe crossing points at C127K Silverburn Road as per S40, S42 and S43 above; and at the Gairn Farm Accommodation Underpass (ch107300) which will be enhanced with standard trees to provise a new commuting route between the Moss and Kingshill Wood. Bats may also use the Moss of Auchlea Drainage system culvert at ch107440. Linear planting either side of the road at the top of the embankment as per the Landscape report Chapter 42, will minimise the likelihood of direct crossings and direct bats toward safe crossing points. Loss of habitat will be offset by linear planting and standard tree planting alongside the scheme as per Landscape report. Disturbance during construction will be reduced by pre-construction survey and provision of temporary screening. During operation mixed woodland planting and barriers as per Landscape report will minimise light and sound impact on roosts at Craiglug and Moss Side of Auchlea. Polution risk will be minimised by generic measures including provision of detention basins.
S45 Moss of Auchlea	Direct mortality due to RTA (high negative/Major). Hydrological impacts on Moss and loss of foraging habitat due to operation (high negative/Major) Severance of commuting routes due to construction (medium negative/Moderate). Severance of commuting routes due to operation (high negative/Major). Disturbance due to construction and operation (medium negative/Moderate). Pollution of Moss and burn due to construction and operation (medium negative/Moderate).	Direct mortality will be reduced by provision of alternative commuting route and safe crossing over the scheme to connect Moss of Auchlea to the woodland area and roosts to the east of the scheme. Safe crossings at Gairn Farm Accommodation Underbridge (ch107300) will provide safe crossing and will be enhanced by standard tree planting either side of the scheme including a line of trees to connect the moss and crossing point with the woodland. Hydrological impacts on the moss will be minimised by measures outlined Appendix 24.1 of the AWPR Environmental Statement 2007. Pollution risk will be minimised by generic measures.

Specific Mitigation Section SL6

6.3.32 The risk of direct mortality during the construction of the proposed scheme will be minimised by generic mitigation measures including undertaking pre-construction surveys, applying for licenses to destroy roosts, and undertaking the work outside sensitive times of year and using soft-felling techniques with a licensed bat worker present.

6.3.33 The provision of safe crossing points at the following locations will minimise the risk of road traffic collisions during the operation of the scheme:

- Fairley Cloghill Overbridge (ch109540);
- Derbeth Overbridge (ch110525); and
- North Kingswells Junction (Northern Leg).

6.3.34 Fairley Cloghill and Derbeth Overbridges will be planted with standard trees and linear planting including pine woodland alongside the scheme at the top of the cutting will direct bats toward the crossing points and reduce the likelihood of bats flying into the path of oncoming traffic. These measures will also reduce the impacts of fragmentation and severance in this section.

6.3.35 Habitat loss will be reduced during construction by minimising the area necessary for works and sensitive location of site compounds and access roads; during operation habitat creation in the form of scrub, mixed woodland and pine woodland planting will provide alternative foraging, roosting and commuting habitat on maturation.

6.3.36 Disturbance will be reduced by generic mitigation measures including the provision of screens and safeguarding of nearby trees with potential for roosting. During operation, the impacts of noise and lights will be reduced by the provision of screening and sensitive lighting.

6.3.37 Pollution will be addressed with generic mitigation measures at Westholme Burn, including the provision of detention basins.

6.3.38 The specific mitigation proposals for Section SL6 are shown in Table 46.

Table 46 – Specific Mitigation Proposals Section SL6

Habitat Area	Impact Magnitude /Significance	Mitigation Measures
S46 Agricultural fields to the north of the A944	Direct mortality due to RTA (medium negative/Moderate). Disturbance due to construction and operation (medium negative/Moderate). Severance of commuting route (medium negative/Moderate). Pollution due to construction and operation (low negative/Minor).	Risk of RTA and severance of a commuting/foraging route along the woodland edge will be minimised by provision of a safe crossing point at Fairley Cloghill Accommodation Overbridge (ch109540) which will be planted up with standard trees to improve connectivity for bats. The road will be in a cutting here so further reduce the RTA risk. Bats may also benefit from the provision of riparian woodland around detention basins at the A944 South Kingswells Junction. Disturbance will be reduced by generic mitigation including pre-works surveys and screens where necessary; barriers and scrub woodland planting will reduce impacts of road traffic noise on active and roosting bats and sensitive lighting at the South Kingswells Junction will minimise impacts on nearby roosts and foraging areas. Generic mitigation including provision of detention basins will reduce risk of pollution of Westholme Burn.
S47 West Hatton Wood DWS	Direct mortality due to construction and operation (medium negative/Moderate). Habitat loss due to construction and operation (medium negative/Moderate). Severance and fragmentation due to construction and operation (medium negative/Moderate). Disturbance due to construction and operation (medium negative/Moderate).	The risk of direct mortality will be minimised by generic mitigation measures including pre-construction surveys, licence applications and soft felling measures, outside the most sensitive times of year and when bats are most likely to be present. The cutting will be kept open to discourage direct crossings and the provision of the safe crossing point at Fairley Cloghill Accommodation Overbridge (as per S46) and linear planting alongside the road/standard tree planting to encourage bats to fly across will reduce RTA risk and enable bats to fly across, thus reducing the severance effects. Habitat loss will be partly offset by provision of replacement bat roost opportunities including wooden and Schwegler bat boxes either side of the road in the existing woodland to be retained. Generic measures including survey and safeguarding roost trees using screens will reduce the disturbance impacts in West Hatton Wood.
S48 Cloghill	No significant impacts predicted (negligible/Negligible).	Generic mitigation will reduce impacts on bat populations.
N1 Kingswells	No significant impacts predicted (negligible/Negligible).	Generic mitigation will reduce impacts on bat populations.
N2 Agricultural fields north of Cloghill	Severance and disturbance due to construction and operation (negligible/Negligible).	Generic mitigation and that proposed for N4 will reduce impacts on bats in this HA.
N3 Derbeth Farm and agricultural land around Fairley Home Farm	Direct mortality due to RTA (medium negative/Moderate). Severance of commuting routes due to construction and operation (medium negative/Moderate).	Direct mortality and severance impacts will be reduced by provision of safe crossing points and the road being in a cutting as per N4.
N4 Woodland at Fairley Home Farm and Derbeth Farm	Direct mortality due to construction and operation (medium negative/Moderate) Habitat loss due to construction and operation (high negative/Moderate). Severance and fragmentation due to construction and operation (high	The risk of direct mortality during construction will be minimised by generic measures including pre-construction survey, licence application and soft-felling techniques. RTA risk will be reduced by the road being in a cutting and the provision of a safe crossing point at Derbeth Overbridge (ch110525) with linear tree planting either side of the road to guide bats toward the crossing. Standard tree planting leading up to the bridge as per Chapter 26 of the AWPR Environmental Statement 2007, will help guide bats to the crossing and retain some connectivity between the east and west of the scheme along the commuting route. Risk of severance due to construction will be minimised by keeping flyways open.

Habitat Area	Impact Magnitude /Significance	Mitigation Measures
	negative/Moderate). Disturbance to roosting and foraging bats due to construction and operation (medium negative/Moderate).	Habitat loss of broadleaved and mixed woodland will be partly offset by scrub planting on the east of the road near the overbridge, and mixed and scrub woodland planting either side of the road. The pond will be replaced on the east of the scheme with no overall loss of habitat. Loss of roost habitat in the short – medium term will be offset by provision of alternative roosts including wooden and schwegler bat boxes suitable for pipistrelle, Myotis and brown long-eared bats in the habitat to be retained either side of the scheme. Disturbance during construction will be reduced by generic mitigation measures including safeguarding roosts adjacent to the areas to be felled. During operation the planting of woodland and linear habitat features will screen roosts and potential roosts/foraging areas from the road.
N6 Woodland west of Hillhead of Derbeth Farm	No significant impacts predicted (negligible/Negligible).	Generic mitigation will reduce impacts on bat populations.
N7 Woodland and shelterbelt east of Hillhead of Derbeth Farm	Direct mortality due to construction and operation (medium negative/Moderate) Habitat loss due to construction and operation (low negative/Minor). Severance and fragmentation due to construction and operation (Medium negative/Moderate). Disturbance due to construction and operation (medium negative/Moderate).	Direct mortality due to construction will be reduced by generic mitigation measures including pre-construction survey, licence application, safeguarding trees to be retained and soft-felling techniques as well as carrying out the felling procedure when bats are not roosting or outside the most sensitive times of year. Risk of RTA during operation will be minimised by provision of a safe crossing point at North Kingswells Junction (see Northern Leg report in Appendix A10.3 of the AWPR Environmental Statement 2007). Loss of the roost will be mitigated by provision of replacement roost sites including wooden and schwegler bat boxes suitable for pipistrelle bats in the habitat to be retained either side of the scheme. The feature of value will be retained elsewhere in the woodland area so there is no overall loss of roost opportunities. Severance and fragmentation will be partly offset by the provision of safe crossings at Derbeth Overbridge as per N4, and at North Kingswells Junction. Linear features and some connectivity between features will be lostwill be lost although alternative commuting routes to the north and south along the scheme will be possible due to linear planting of pine woodland at the top of the cutting. Disturbance will be reduced by generic measures during construction and operation, with the proposed mitigation planting acting as a screen during operation.
N8 Scrub and bracken on lower slopes of Brimmond Hill - SINS	Habitat loss due to construction and operation (low negative/Minor). Disturbance of bat behaviour due to construction and operation (Medium negative/Minor).	Habitat Loss will be partially offset by the provision of overland commuting routes along the proposed scheme as per Chapter 26 of the AWPR Environmental Statement 2007, which will offer connectivity to alternative foraging areas further south. Disturbance during construction will be reduced by generic measures. No mitigation will be provided during the operational phase.
N9 Dry heath on upper slopes of Brimmond Hill - SINS	No significant impacts predicted (negligible/Negligible).	Generic mitigation will reduce impacts on bat populations.
N10 Agricultural fields south of C89c and Overhills Farm	No significant impacts predicted (negligible/Negligible).	Generic mitigation will reduce impacts on bat populations.

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 minimised. 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 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 minimise the risk of 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.

Specific Residual Impacts

7.1.8 There are a number of areas where residual impacts would be predicted after mitigation as the measures to be implemented would not completely remove the impacts on bats.

7.1.9 In Section SL1, fragmentation of woodland and scrub habitat east of Greenhowe (S3) would be predicted to have remaining impacts of low negative magnitude and Minor significance on the small population of bats which forage there due to the road cutting through, although the lost habitat will be offset by pond replacement and planting. Conversely, the lost woodland and ride habitat at Greenhowe Wood (S6) would not be replaced and the habitat would remain fragmented giving rise to low negative and Minor significant impacts on the small local bat population. This would be due to the reduced availability of foraging resources due to their location on either side of the road, and due to long distances between crossing points, which would not be ideally situated in relation to the present resources and flight routes. Some severance and RTA impacts at Causey Maunth Road would be predicted to remain due to the slight offset of the Duffshill Accommodation Overbridge from the existing commuting route, resulting in low negative and Minor significant impacts.

7.1.10 In Section SL2, the scheme passes through predominantly agricultural land with limited value inherently and the main issues that would be likely to remain would be due to indirect severance of higher value habitats to the north (including Shanna Burn Wood, Kingcausie, Cleanhill and Hill of Blairs) and south (including Clochandighter) of the scheme. This would result in low negative and Minor significant residual impacts at S15 and S16 in the west of this section as the overall provision of crossing points would be fewer than the current level.

7.1.11 Section SL3 would be predicted to have the highest proportion of significant residual impacts due to the high overall value of the habitats found in this section. Fragmentation of habitats and disturbance of foraging bats due to junction lighting would remain an issue at Blaikiewell Farm due to changes in the current low levels of disturbance. Habitat loss would remain an impact at Cleanhill Wood which the road will bisect, resulting in impacts of low negative and Minor significance during construction and medium/Moderate significance during operation if bats cannot reach habitats either side of the road. Disturbance would also remain an issue in this Habitat Area (low negative/Minor). Fragmentation and disturbance would also be predicted to remain as low negative and Minor significant impacts at agricultural fields within Kingcausie (S23). Habitat loss (low negative/Minor during construction and medium negative/Moderate during operation) and fragmentation of woodland habitats (medium negative/Moderate) would remain where high value mature woodland is to be felled in Kingcausie with resulting disturbance to foraging and roosting bats (low negative/Minor). Severance of the Old Deeside Railway Line DWS due to construction and operation would be predicted to result in fragmentation of this excellent foraging and commuting habitat despite construction of the Milltimber Brae Overbridge resulting in residual impacts of medium negative magnitude and Moderate significance.

7.1.12 In Section SL4, significant impacts on the local bat populations would be predicted to remain after mitigation in S32 where the loss of the roost at the International School would cause temporary loss of maternity roost habitat and fragmentation of foraging habitats (medium negative/Moderate significance), with potential RTA impacts if bats attempt to cross the operational road (low negative/Minor). Similar RTA and fragmentation impacts are predicted in Milltimber (S33) and the

severance of probable commuting corridors connecting foraging habitat at Guttrie Hill (S34) and Milltimber Wood (S35) would result in medium negative magnitude and Moderate significant impacts despite the provision of a crossing point at Milltimber junction, as this would not be a like-for-like replacement. Habitat loss of mixed mature woodland in Beanshill would result in construction and operation impacts of low negative magnitude and Minor significance. The severance of commuting routes between Beanshill and Contlaw Road would result in low negative and Minor significant impacts as alternative commuting routes would be provided by linear planting alongside the road to safe crossing points.

7.1.13 In Section SL5, some connectivity and the ability for bats to cross the road safely would be compromised in the long term resulting in low negative and Minor significant impacts in Habitat Area S43, S44 and S45 as the overall provision for bats to cross the scheme would be reduced despite the provision of crossing points at Silverburn Road, Gairn Farm Accommodation Underpass and culverts. In addition, potential habitat loss at the Moss of Auchlea have been assessed as low negative and Minor significance impact on the foraging habitat resource at that location.

7.1.14 In Section SL6 the severance and fragmentation of small areas of high value foraging and roosting habitat would be predicted to result in residual impacts of low - medium negative magnitude and Minor - Moderate significance at West Hatton Woods (S47), woodland at Fairley Home Farm and Derbeth Farm (N4), Woodland and shelterbelt east of Hillhead of Derbeth Farm (N7) and scrub on the slopes of Brimmond Hill (N8). These impacts are relatively high due to the strategic nature of these habitats in relation to roosting habitat at Kingswells.

7.1.15 The residual impacts of the proposed scheme are shown below in Table 47.

Table 47 – Residual Impacts

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
Section SL1					
S1 Hatton Wood	Construction/ operation	No direct impacts predicted due to distance from scheme.	Negligible/ negligible	No specific mitigation required.	Negligible/ negligible
S2 Agricultural fields east of the A90	Construction / operation	No direct mortality predicted due to absence of roosts under alignment.	Negligible/ negligible	No specific mitigation required.	Negligible/ negligible
		No loss of bat habitat due to scheme passing through low value farmland.	Negligible/ negligible	No specific mitigation required	Negligible/ negligible
		A90 amendments would not be expected to change existing levels of fragmentation between roosts in the east and foraging in the west.	Negligible/ negligible	No specific mitigation required.	Negligible/ negligible
		Disturbance possible during construction due to proximity of roosts to proposed scheme if works compounds are located nearby; no change to existing conditions expected during operation.	Medium Negative/ moderate (construction); Negligible /Negligible (operation)	Disturbance will be reduced by sensitive location of site access roads, compounds and plant during construction, with vibration and noise kept to a minimum within 50m of roost during breeding and hibernating period. There will be no night works during construction. Impacts on resident bat population will be minimal.	Negligible/Negligible
		Potential downstream impacts on water quality of Loirston Loch due to spills during construction or runoff during operation.	Medium negative / moderate	Generic mitigation will minimise the risk of pollution during construction and operation.	Negligible / negligible
S3 Wood / scrub mosaic east of Greenhowe	Construction / operation	No direct mortality predicted due to absence of roosts under alignment.	Negligible/ negligible	No specific mitigation required.	Negligible/ negligible
		Loss of Greenhowe Quarry Pond and subsequent loss of aquatic invertebrate foraging resource and potential swarming site.	Moderate Negative / moderate	Creation of a replacement pond will offset loss of Greenhowe Pond and mitigate against the loss of foraging habitat. The existing wet woodland will be retained with additional riparian planting added. Additional broadleaved and mixed woodland will be planted to offset habitat loss (for additional information see the Landscape report in Chapter 26). No overall loss of foraging habitat.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
		Proposed scheme and construction works will fragment foraging habitat with approx. 30% south of the scheme and 70% north of the scheme, with implications for foraging behaviour; severance of potential commuting route along woodland edge.	Medium negative /moderate	Risk of severance of commuting route due to operation will be minimised by retention of the commuting route through provision of safe crossing at Hatton Accommodation Underbridge although this will be slightly set back from the habitats either side of the road and there may be some remaining severance.	Low negative / minor
		Disturbance to foraging and commuting bats likely due to construction works and traffic.	Medium negative / moderate	Disturbance will be reduced by sensitive location of site access roads, compounds and plant during construction, with vibration and noise kept to a minimum within 50m of roost during breeding and hibernating period. There will be no night works during construction.	Negligible/Negligible
		No pollution predicted due to loss of water feature.	Negligible / negligible	No specific mitigation required.	Negligible/ negligible
S4 Bog south of Greenhowe	Construction / operation	No direct impacts predicted due to distance from scheme.	Negligible / negligible	No specific mitigation required.	Negligible/ negligible
S5 Agricultural fields south of Greenhowe	Construction / operation	No direct impacts predicted due to lack of resources under alignment.	Negligible / negligible	No specific mitigation required.	Negligible/ negligible
S6 Greenhowe	Construction / operation	No direct mortality predicted due to absence of roosts under alignment.	Negligible / negligible	No specific mitigation required.	Negligible/ negligible
		Loss of low value conifer plantation woodland and foraging habitat due to construction and operation.	Low negative / minor	No planting proposed to replace habitat lost.	Low negative / minor
		Severance of rides and fragmentation of foraging habitats.	Medium negative / Minor	Disturbance of foraging and roosting bats during construction will be reduced by limiting works to daytime only and keeping flyways open during construction. Culvert at Lorston Burn (ch205580) may provide safe crossing point for by bats during operation and Hatton Accommodation Overbridge will also provide some connectivity. Crossing points will be monitored to ensure use by bats. Mixed woodland planting along road as per Chapter 26 of the AWPR Environmental Statement 2007, will direct bats to safe crossing points. Severance will not be completely mitigated due to	Low negative / minor

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
				distances between crossings and their location is not ideal due to the absence of commuting routes.	
		Some disturbance possible to foraging and commuting bats due to construction works and traffic but small number of bats impacted.	Low negative / minor	Disturbance will be reduced by sensitive location of site access roads, compounds and plant during construction, with vibration and noise kept to a minimum within 50m of roost during breeding and hibernating period. There will be no night works during construction. Where possible flyways will be created to encourage bats to continue to use current commuting pathways during construction.	Negligible /negligible
		No pollution predicted due to lack of watercourses.	Negligible / negligible	No specific mitigation required.	Negligible/ negligible
S7 Duff's Hill	Construction / operation	No significant direct impacts predicted due to lack of resources under alignment.	Negligible / negligible	No specific mitigation required.	Negligible/ negligible
S8 Agricultural fields west of Duff's Hill	Construction / operation	No significant direct impacts predicted due to lack of resources under alignment.	Negligible / negligible	No specific mitigation required.	Negligible/ negligible
S9 Wood west of Greenhowe	Construction / operation	No direct mortality predicted during construction due to absence of roosts under alignment; RTA possible due to operation due to severance of Causey Maunth Road and associated commuting route.	Negligible/ negligible (construction) Medium negative / moderate (Operation)	No specific mitigation required (construction). During the operation phase provision of a safe crossing point at Duffshill AccommodationOverbridge will reduce RTAs by providing safe crossing point however this will be slightly set back and some bats may still attempt to fly directly over the road.	Negligible / negligible (Construction) Low negative / Minor (Operation)
		No habitat loss predicted due to absence of resources under alignment.	Negligible / negligible	No specific mitigation required.	Negligible/ negligible
		Severance of pipistrelle bat commuting route along Causey Maunth Road although small numbers of bats would be impacted.	Medium negative / moderate	Severance of commuting routes will be reduced by sensitive location of site access roads, compounds and plant during construction, with vibration and noise kept to a minimum within 50m of roosts during breeding and hibernating period. There will be no night works during construction. Where possible flyways will be created to encourage bats to continue to use current commuting pathways during construction.	Low negative / minor

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
				Scrub will be planted to integrate the bridge of Duff's Hill and screen the road corridor (see landscape chapter 20)and to encourage the usage of the bridge by bats however the setback of the overbridge from the existing commuting route may result in slight severance issues.	
		Disturbance of commuting bats likely during operation of road due to severance of commuting route.	Medium negative / moderate	Disturbance of foraging and roosting bats during construction will be reduced by limiting works to daytime only and keeping flyways open with no significant overall impact on bat behaviour predicted.	Negligible/Negligible
		No pollution predicted due to absence of water features.	Negligible / negligible	No specific mitigation required.	Negligible/ negligible
S10 Hare Moss	Construction / operation	No direct mortality predicted due to absence of roosts under alignment and no fragmentation during operation.	Negligible / negligible	No specific mitigation required.	Negligible/ negligible
		Loss of southern edge of moss due to construction and potential hydrological impacts on the moss due to operation with potential consequences on the suitability of the moss as a foraging resource.	Medium negative / moderate	The impacts of pollution will be mitigated by generic mitigation measures including sensitive location of site access roads and compounds and best practice. Burns feeding the moss will be culverted and hydrological properties unlikely to alter significantly in the long term impacts predicted to be minimal. Sensitive design of detention basins and no planting to be undertaken will minimise impact on hydrology of the moss.	Negligible/Negligible
		No fragmentation predicted due to loss of extreme southern edge of moss habitat and lack of resources on southern side of road.	Negligible / negligible	No specific mitigation required.	Negligible/ negligible
		Disturbance to foraging behaviour of bats likely due to disturbance during construction and traffic during operation.	Low negative / minor	Disturbance will be reduced by sensitive location of site access roads, compounds and plant during construction, with vibration and noise kept to a minimum within 50m of roost during breeding and hibernating period. There will be no night works during construction. Where possible flyways will be created to encourage bats to continue to use current commuting pathways during construction. The culvert at Burn of Ardoe (ch 203030) will provide safe crossing point for use by	Negligible/ negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
				bats during operation of the scheme.	
		Pollution of moss and Burn of Ardoe and associated reduction in suitability of foraging habitat due to spills during construction and operation.	Medium negative /moderate	Generic mitigation will minimise the risk of pollution during construction and operation.	Negligible /negligible
Section SL2					
S11 North of Sunnyside	Construction / operation	No direct impacts predicted as woodland to be retained.	Negligible/ negligible	No specific mitigation required.	Negligible/ negligible
S12 Greenloaning Wood	Construction / operation	No direct impacts predicted due to distance from proposed scheme.	Negligible / negligible	No specific mitigation required.	Negligible/ negligible
S13 Agricultural fields around Sunnyside to Causeyport	Construction / operation	No direct mortality predicted due to absence of roosts under proposed alignment.	Negligible / negligible	No specific mitigation required.	Negligible/ negligible
		No significant loss of habitat due to low value of habitats directly under alignment.	Negligible / negligible	No specific mitigation required.	Negligible/ negligible
		Severance of three commuting routes due to construction works and traffic creating barrier to movement north-south across scheme between foraging and roosting habitat during operation with implications for commuting pipistrelle and brown long-eared bats.	Medium negative / moderate	Sensitive location of site access roads, compounds and plant and minimisation of disturbance during construction with flyways kept open to encourage bats to continue to use current commuting pathways will reduce severance during construction. The enhanced overbridges at Duffs Hill Accommodation Overbridge, Bishopston Accommodation Overbridge, Merchants Croft Overbridge and the C5K Overbridge at Burnhead as well as culverts at Healthfield Burn (ch203650), Burn of Ardoe (ch 204040), Bishopton Ditch (ch203900) will provide additional safe crossing point for by bats. In this Habitat Area the provision of crossings is considered to minimise residual impacts of severance and fragmentation.	Negligible/Negligible
		Disturbance of commuting behaviour during construction and operation due to fragmentation of commuting routes.	Low negative / minor	Disturbance will be reduced by generic mitigation measures and keeping flyways open.	Negligible/Negligible
		No pollution predicted due to lack of crossings in this HA.	Negligible / negligible	No specific mitigation required.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
S14 Clochandighter Wood	Construction / operation	No direct impacts predicted due to distance from scheme; indirect fragmentation due to woodland and associated foraging habitats being cut off from roosting and alternative foraging habitat to the north of the scheme during operation as per S13/S16.	Medium negative / moderate	Severance of commuting routes will be reduced by sensitive location of site access roads, compounds and plant during construction, with vibration and noise kept to a minimum within 50m of roosts during breeding and hibernating period. There will be no night works during construction. Where possible flyways will be created to encourage bats to continue to use current commuting pathways during construction. Sensitive location of site access roads, compounds and plant and minimisation of disturbance during construction will be carried out. Flyways will be kept open to encourage bats to continue to use current commuting pathways to reduce severance during construction. The enhanced overbridges at Duffs Hill Accommodation Overbridge, Bishopston Accommodation Overbridge, Merchants Croft Overbridge and the C5K Overbridge at Burnhead as well as culverts at Healthfield Burn (ch203650), Burn of Ardoe (ch 204040), Bishopton Ditch (ch203900) will provide additional safe crossing point for by bats. In this Habitat Area the provision of crossings is considered to minimise residual impacts of severance and fragmentation.	Negligible/Negligible
S15 Whitestone Wood and Hill of Blairs	Construction /operation	Indirect fragmentation of foraging habitat and roosting sites during the operation of the scheme (Medium negative /Minor).	Medium negative / moderate	The above mitigation measures will reduce the risk of severance during construction to negligible significance. During operation, the provision of safe crossing points at Merchant's Croft and Burnhead will partly offset the severance of commuting routes. However, there will not be like-for-like replacement and there may still be some impacts as bats will have to get used to the new routes.	Low negative / minor

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
S16 Agricultural fields to the east of Burnhead to Greenloaning	Construction / Operation	Direct mortality due to RTAs during operation of the scheme (High negative/moderate).	Medium negative / moderate	Felling and demolition must be carried out by experienced contractors and under the supervision of licensed bat workers. Trees with roost potential must 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 must 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.	Negligible / negligible
		Habitat loss due to construction of scheme (Medium negative/ Moderate).	Medium negative /moderate	Scrub will be planted to integrate the Duffshill Accomodation Overbridge and screen the road corridor (see landscape chapter 20) and mixed woodland and scrub to encourage usage of bridges by bats for commuting between habitat areas and reduce RTAs during the operation of the road. Culverts at Healthfield Burn (ch203650), Burn of Ardoe (ch 204040), Bishopton Ditch (ch203900) and Lorston Burn(ch205580) will provide additional safe crossing point for by bats during operation.	Negligible / negligible
		Severance and fragmentation of foraging and roosting habitat during construction and operation of the scheme (High negative /Moderate).	Medium negative/ moderate	Sensitive location of site access roads, compounds and plant and minimisation of disturbance during construction with flyways kept open to encourage bats to continue to use current commuting pathways will reduce severance during construction. The enhanced overbridges at Duffs Hill Accommodation Overbridge, Bishopston Accommodation Overbridge, Merchants Croft Overbridge and the C5K Overbridge at Burnhead as well as culverts at Healthfield Burn (ch203650), Burn of Ardoe (ch 204040), Bishopton Ditch (ch203900) will provide additional safe crossing point for by bats. However there will not be like-for-like replacement of commuting routes and some well-used routes will not be provided making journey	Low negative / Minor

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
				distances longer.	
		Disturbance of foraging and commuting behaviour during construction and operation of the scheme (Medium negative/ Moderate).	Medium negative / moderate	The above mitigation will reduce disturbance to foraging, roosting and commuting bats with scrub and woodland planting either side of the scheme acting as screens during operation with no overall impact on bat behaviour predicted.	Negligible/Negligible
		Potential pollution during construction and operation of scheme (Low negative/ Minor).	Low negative/ minor	Generic mitigation will minimise the risk of pollution during construction and operation.	Negligible/ negligible
Section SL3					
S17 Agricultural fields south of Cleanhill Wood	Construction / Operation	No direct mortality, habitat loss, disturbance or pollution predicted due to distance from scheme.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
		Indirect severance due to construction and operation as a result of severance of commuting route along burnhead as per S16 and breakdown of linear route between key habitats in Kingcausie and south of proposed scheme.	Medium negative/Moderate	C5K Overbridge to be provided at Burnhead and enhanced with planting will reduce impacts of indirect severance during operation.	Negligible/Negligible
S18 Durris Forest	Construction / Operation	No direct impacts predicted due to distance from scheme.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
S19 Blaikiewell Farm	Construction / Operation	No direct mortality due to construction due to absence of roosts under alignment.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
		Minimal habitat loss due to construction and operation due to overall low value of habitats.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
		Fragmentation of habitat area would cut building and potential roost opportunities off from foraging/roosting habitats in Kingcausie and Cleanhill.	Medium negative/Minor	Fragmentation during construction operation will be offset by retention of flyways along Blaikiewell Burn and the road so bats can still fly across. There is likely to be some fragmentation due to the presence of the junction.	Low negative/Minor
		Minimal disturbance to foraging bats possible during construction of junction.	Medium negative/Minor	Generic mitigation measures and screening at junction will reduce impacts on bats although some disturbance likely until habitat matures.	Low negative/Minor
		No pollution predicted due to absence of watercourses.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
S20 Cleanhill Wood	Construction	Direct mortality possible during felling of potential roost trees.	High negative/Moderate	Generic measures including further survey, licence application and soft felling will mitigate impacts on bats.	Negligible/Negligible
		Loss of mature broadleaved and conifer plantation woodland and associated foraging and roosting potential due to clearance for construction and access roads/plant.	Medium negative/Moderate	Limiting habitat loss to area of works and planting of alternative riparian habitat and bat box provision will partly reduce habitat loss.	Low Negative/Minor
		Fragmentation of woodland area due to clearance for construction.	High negative/Moderate	Commuting route will be retained during construction.	Negligible/Negligible
		Disturbance of foraging, roosting and commuting bats likely due to construction.	Medium negative/Moderate	Generic measures including no night working will mitigate impacts on bats.	Negligible/Negligible
		No pollution predicted due to absence of watercourses.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
	Operation	Direct mortality due to RTA if bats continue to fly across scheme during operation.	High negative/Moderate	Provision of safe crossings and the road being in a cutting will reduce RTA risk.	Low negative/Minor
		Loss of mature broadleaved and conifer plantation woodland and associated foraging and roosting potential on either side of the road if bats cannot cross; permanent loss of a strip of woodland.	High negative/Moderate	Scrub and broadleaved woodland planting will reduce and offset some habitat loss, although the effective loss of woodland on either side cannot be mitigated for.	Medium negative/Moderate
		Fragmentation and severance of Cleanhill Wood along a green corridor and isolation of features either side of the road if bats cannot cross safely.	High negative/Moderate	Provision of safe crossings and planting to direct bats to crossings will reduce fragmentation although large distances between crossing points will mean that habitat areas remain effectively fragmented.	Medium negative/Moderate
		Disturbance of commuting and foraging corridors likely due to disturbance from the road.	Medium negative/Moderate	Generic measures and screening will reduce impacts on adjacent habitat area in the long term although there may be short – medium term impacts until the habitat matures.	Low negative/Minor
		No pollution predicted due to absence of watercourses.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
S21 Agricultural fields below Parkhead	Construction / Operation	No impacts predicted due to distance from scheme and lack of resources.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
S22 Floodplain and immediate	Construction	Direct mortality if bats roosting in trees to be felled.	High negative/Major	Generic measures including further survey, licence application and soft felling will mitigate impacts on bats.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
surrounds of Crynoch Burn (north) and Blaikiewell Burn		Loss of riparian and woodland edge habitat and associated foraging and roosting habitat along Blaikiewell Burn due to construction of buried structure and underbridge.	Medium negative/Moderate	Miniminsation of area cleared for construction and provision of replacement habitat will partly reduce habitat loss.	Low negative/Minor
		Fragmentation of foraging routes and severance of commuting routes along edge of Cleanhill Wood and Blaikiewell Burn and road due to construction of buried structure and bridge.	Medium negative/Moderate	Commuting route will be retained during construction.	Negligible/Negligible
		Disturbance of foraging and commuting behaviour likely due to construction activities.	Medium negative/Moderate	Generic measures including no night working will mitigate impacts on bats.	Negligible/Negligible
		Potential pollution of Blaikiewell Burn and downstream impacts on Crynoch Burn and suitability as foraging habitat due to spills during construction.	Medium negative/Moderate	Generic measures will mitigate impacts on bats.	Negligible/Negligible
	Operation	No direct mortality predicted from RTA due to retention of commuting routes and foraging corridors during operation due to provsion of buried structure and underbridge.	Negligible/Negligible	No impact predicted as Blaikiewell Burn and road due to retention of flyways through buried structure and bridge in operation.	Negligible/Negligible
		Loss of roosting and foraging habitat due to operation of the road.	Medium negative/Moderate	Tree planting and other habitat creation will offset loss of scrub and riparian habitat with little overall loss of habitat.	Low negative/Minor
		Fragmentation of foraging corridors and commuting routes unlikely to occur due to provision of safe crossing points large enough for bats to fly through and subsequent retention of connectivity.	Negligible/Negligible	No impact predicted as Blaikiewell Burn and road due to retention of flyways through buried structure and bridge in operation.	Negligible/Negligible
		Some long term disturbance of roosting, foraging and commuting behaviour due to the operation of the road.	Medium negative/Moderate	Minimisation of lighting at junction and tree planting either side of the road will reduce disturbance although there may be short – medium term impacts until habitat matures.	Low negative/Minor
		Potential pollution of Blaikiewell Burn and downstream impacts on Crynoch Burn and associated suitability for foaging due to spills and polluted runoff.	Medium negative/Moderate	Generic measures including provision of detention basins will mitigate impacts on bats.	Negligible/Negligible
S23 Agricultural fields within Kingcausie	Construction	No direct mortality predicted due to absence of roosts or potential roosts under alignment.	Negligible/Negligible	Generic mitigation will reduce impacts on bats.	Negligible/Negligible
		Minimal loss of habitat predicted due to low inherent value of agricultural land for bats.	Negligible/Negligible	Generic mitigation will reduce impacts on bats.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
		Fragmentation of foraging habitat and commuting routes due to proximity to roost at Eastland.	Medium negative/Moderate	Commuting route will be retained during construction.	Negligible/Negligible
		Disturbance of roosting bats and subsequent abandonment of roost possible during construction if roost characteristics including linear commuting features and light levels change.	High negative/Major	Sensitive siting of compounds and site accesses, works to be undertaken outside hibernating and breeding periods, provision of screening and no night works will reduce disturbance.	Negligible/Negligible
		No pollution predicted due to absence of watercourses.	Negligible/Negligible	Generic mitigation will reduce impacts on bats.	Negligible/Negligible
	Operation	Direct mortality due to RTA if bats continue to fly from roost to foraging habitats in Kingcausie across the road.	High negative/Major	Provision of safe crossing at Kingcausie and Eastland Underpass will provide safe crossing point; road in a cutting and linear planting alongside road will also reduce likelihood of bats flying into oncoming traffic.	Negligible/Negligible
		No significant permanent habitat loss predicted due to absence of features under alignment.	Negligible/Negligible	Generic mitigation will reduce impacts on bats. Bat box provison and boxes in the underpass will also benefit bats.	Negligible/Negligible
		Some fragmentation of roosting and foraging corridors due to proximity of road to rooat at Eastland although alternative safe crossing point will be provided at Kingcausie/Eastland accommodation underbridge.	Medium negative/Moderate	Provision of safe crossing at Kingcausie and Eastland Underpass and enhancement with planting and roost provision will provide safe crossing point and connectivity between fragments of woodland. Fewer connection points between east and west may result in some residual fragmentation if bats cannot find crossing points or if journey is too far.	Low negative/Minor
		Disturbance and permanent displacement of bats from roost if roost characteristics change or roost becomes unsuitable for bats.	High negative/Major	Screening will reduce impacts on adjacent habitat area in the long term although there may be short – medium term impacts until the habitat matures.	Low negative/Minor
		No pollution predicted due to absence of watercourses.	Negligible/Negligible	Generic mitigation will reduce impacts on bats.	Negligible/Negligible
S24 Kingcausie	Construction	Direct mortality if bats roosting in trees to be felled.	High negative/Major	Generic measures including further survey, licence application and soft felling will mitigate impacts on bats.	Negligible/Negligible
		Loss of woodland, edge and riparian habitat and associated foraging and roosting habitat due to construction and burn realignment.	Medium negative/Moderate	Limiting clearance to minimum area necessary and habitat creation including bat box provision will reduce impacts of habitat loss.	Low negative/Minor

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
		Fragmentation of woodland habitats and severance of roosts on either side of the road.	High negative	Commuting route will be retained during construction.	Negligible/Negligible
		Disturbance of foraging, roosting and commuting bats likely due to construction works in woodland.	Medium negative/Moderate	Generic mitigation including no night working and screening to safeguard roosts will reduce impacts on bats.	Negligible/Negligible
		Potential pollution of Kingcausie Burn and downstream effects on Crynoch Burn with associated impacts on aquatic insect availability due to spills during construction.	Medium negative/Moderate	Sensitive design of burn realignment and generic measures to minimise the risk of pollution will reduce impacts on bats.	Negligible/Negligible
	Operation	Direct mortality due to RTA if bats continue to cross road to get to resources on the other side during operation.	High negative/Major	Provision of safe crossing at Kingcausie and Eastland Underpass, Kingcausie Burn Culvert and the River Dee Crossing will provide safe crossing points; road in a cutting and linear planting alongside road will also reduce likelihood of bats flying into oncoming traffic.	Negligible/Negligible
		Loss of woodland, edge and riparian foraging habitat due to operation.	High negative/Major	Habitat creation, bat box provison and boxes in the underpass will reduce impacts of habitat loss but there would still be effective loss of woodland either side if bats are unable to cross the road and there would be short-medium term impacts until newly created habitat matures.	Medium negative/Moderate
		Fragmentation of high value woodland foraging habitat and commuting routes between maternity roost sites and effective loss of woodland habitat either side if bats cannot cross.	High negative/Major	Provision of safe crossings as above and enhancement with planting and roost provision will provide safe crossing point and connectivity between fragments of woodland. Fewer connection points between east and west compared to present conditions will result in some residual fragmentation if bats cannot find crossing points or if journey is too far.	Medium negative/Moderate
		Disturbance of foraging and commuting bats due to operation of road and reduction in suitability of foraging sites from light and traffic noise.	Medium negative/Moderate	Screening will reduce impacts on adjacent habitat area in the long term although there may be short – medium term impacts until the habitat matures.	Low negative/Minor
		Potential pollution of realigned Kingcausie Burn and downstream impacts on Crynoch Burn due to spills and polluted runoff during operation.	Medium negative/Moderate	Generic mitigation will reduce impacts on bats.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
S25 Caravan Park	Construction / Operation	No direct impacts predicted due to distance from scheme.	Negligible/Negligible	Generic mitigation will reduce impacts on bats.	Negligible/Negligible
S26 Old Mill Inn and agricultural field surrounds	Construction / Operation	No direct impacts predicted due to distance from scheme.	Negligible/Negligible	Generic mitigation will reduce impacts on bats.	Negligible/Negligible
S27 Agricultural fields south of the River Dee	Construction	Direct mortality if bats roosting in trees to be felled during construction.	High negative/Moderate	Generic measures including further survey, licence application and soft felling will mitigate impacts on bats.	Negligible/Negligible
		Minimal loss of potential roost trees and foraging/commuting habitat alongside South Deeside Road.	Low negative/Minor	Generic mitigation and habitat creation will reduce and offset habitat lost.	Negligible/Negliible
		Severance of commuting route along B9077 South Deeside Road due to construction of Dee Crossing.	Medium negative/Moderate	Commuting route will be retained during construction.	Negligible/Negligible
		Minimal disturbance and disruption of roosting, commuting and foraging bats due to felling and bridge construction.	Low negative/Minor	Disturbance would be minimised by generic mitigation measures and no lighting during construction.	Negligible/Negligible
		No pollution predicted due to absence of watercourses.	Negligible/Negligible	Generic mitigation will reduce impacts on bats.	Negligible/Negligible
	Operation	Direct mortality due to RTA during operation of the road not predicted due to retention of safe crossing points.	Negligible/Negligible	High span crossing will allow bats to fly underneath safely along the river and banks.	Negligible/Negligible
		Minimal permanent habitat loss of mature broadleaved trees and foraging/roosting habitat along South Deeside Road.	Low negative/Minor	Habitat creation and bat box provision alongside the River Dee and in Kingcausie will offset habitat loss in the medium term until habitat matures.	Negligible/Negligible
		No permanent fragmentation or severance of commuting routes predicted due to retention of commuting routes under Dee Crossing so connectivity along the green corridor is retained.	Negligible/Negligible	High span crossing will allow bats to fly underneath safely along the river and banks.	Negligible/Negligible
		Minimal disturbance due to operational scheme (traffic noise and lights).	Low negative/Minor	Disturbance would be minimised by generic mitigation measures and no lighting on the bridge; bats will become accustomed to disturbance.	Negligible/Negligible
		No pollution predicted due to absence of watercourses.	Negligible/Negligible	Generic mitigation will reduce impacts on bats.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
S28 Floodplain and immediate surrounds of the River Dee	Construction	No direct mortality predicted due to absence of roosting opportunities under scheme.	Negligible/Negligible	Generic measures including further survey, licence application and soft felling will mitigate impacts on bats.	Negligible/Negligible
		Minimal loss of riparian and bankside habitat due to clearance for construction.	Low negative/Minor	Generic mitigation and habitat creation will reduce and offset habitat lost.	Negligible/Negliible
		Fragmentation of foraging and commuting route along the River Dee during bridge construction and effective loss of habitat either side if bats cannot fly through.	High negative/Major	Commuting route will be retained during construction.	Negligible/Negligible
		Disruption of foraging and commuting behaviour likely over the river due to bridge construction.	Medium negative/Moderate	Disturbance would be minimised by generic mitigation measures, no lighting during construction and no access to the woodland area to the east of the crossing.	Negligible/Negligible
		Potential pollution of the River Dee due to spills during construction and associated downstream impacts on suitability of river for foraging.	High negative/Major	Generic mitigation will reduce impacts on bats.	Negligible/Negligible
	Operation	No direct mortality predicted due to high span bridge with space for bats to fly safely underneath.	Negligible/Negligible	High span crossing will allow bats to fly underneath safely along the river and banks.	Negligible/Negligible
		Minimal permanent habitat loss predicted along the river banks.	Low negative/Minor	Habitat creation and bat box provision alongside the River Dee will offset habitat loss in the medium term until habitat matures	Negligible/Negligible
		No fragmentation or severance of foraging or commuting routes predicted due to retention of flight path underneath Dee Crossing.	Negligible/Negligible	High span crossing will allow bats to fly underneath safely along the river and banks.	Negligible/Negligible
		Disturbance of foraging and roosting bats in the woodland adjacent to the Dee if lights shine on the river	Medium negative/Moderate	Disturbance would be minimised by generic mitigation measures and no lighting/screening on the bridge; bats will become accustomed to disturbance	Negligible/Negligible
		Potential pollution of the river due to contaminated runoff during operation with downstream impacts on water quality and foraging suitability.	High negative/Major	Generic mitigation including detention basin provision will reduce impacts on bats.	Negligible/Negligible
S29 Agricultural fields south of Milltimber	Construction / Operation	No direct mortality predicted due to absence of potential roosts under alignment.	Negligible/Negligible	Generic mitigation will reduce impacts on bats.	Negligible/Negligible
		Loss of farmland habitat would not affect the foraging habitat resource.	Negligible/Negligible	Generic mitigation will reduce impacts on bats.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
		No fragmentation predicted as commuting routes do not cross the scheme.	Negligible/Negligible	Generic mitigation will reduce impacts on bats.	Negligible/Negligible
		No disturbance predicted due to absence of foraging habitat.	Negligible/Negligible	Generic mitigation will reduce impacts on bats.	Negligible/Negligible
		Minimal pollution predicted due to spills or contaminated runoff to Milltimber Burn and the River Dee during construction and operation resulting in reduced suitability of downstream foraging habitats.	Medium negative/Moderate	Generic mitigation including detention basin provision will reduce impacts on bats.	Negligible/Negligible
S30 Camphill School	Construction / Operation	No direct impacts predicted due to distance from scheme. Indirect severance due to scheme crossing Old Deeside Line is assessed for S31 below.	Negligible/Negligible	Generic mitigation will reduce impacts on bats.	Negligible/Negligible
S31 Deeside Old Railway Line	Construction / Operation	No direct mortality predicted during construction due to absence of trees with roost potential under alignment.	Negligible/Negligible	Generic mitigation will reduce impacts on bats.	Negligible/Negligible
		Direct mortality due to RTA during operation due to severance of commuting route and no provision for bats to cross.	High negative/Moderate	Screening and tree planting and the road being in a crossing will minimise the risk of direct road crossings.	Negligible/Negligible
		Loss of strip of broadleaved woodland and scrub alongside Old Deeside Line and associated reduction in suitability of foraging habitat.	Medium negative/Moderate	Planting around detention basins will create new foraging habitat suitable for bats with no overall loss of foraging resource.	Negligible/Negligible
		Fragmentation of commuting route along the old railway line with subsequent fragmentation of foraging and roosting habitats along a green corridor.	High negative/Moderate	Commuting route will be retained during construction. Milltimber Brae Overbridge will offset some severance but the linear nature of the feature will be lost with effective loss of resources either side if bats cannot cross. Combined impacts of existing B979 and new crossing may render commuting route defunct for bats flyig east-west.	Medium negative/Moderate
		Disruption of bat commuting routes and foraging habitat due to construction and operation will affect behaviour and may force bats to find alternative routes.	Medium negative/Moderate	Commuting routes will be kept open during construction; disruption of flight paths and behaviour likely to be permanently affected.	Medium negative/Moderate
		No pollution predicted due to absence of watercourses.	Negligible/Negligible	Generic mitigation will reduce impacts on bats.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
Section SL4					
S32 East Peterculter and western Milltimber	Construction	Direct mortality due to the demolition of a mixed brown long-eared and pipistrelle maternity roost at the International School.	High negative/Major	Survey/monitoring, license application, exclusion prior to demolition and undertaking work outside sensitive times of year will minimise the risk of bats being killed.	Negligible/Negligible
		Loss of roost (and potential hibernaculum) at the International School and associated urban foraging habitat.	High negative/Major	Provision of bat house and heated bat boxes for alternative roost prior to demolition will ensure no net loss of roost opportunities. However bats are unlikely to take to the roost immediately.	Low negative/Minor
		Fragmentation of foraging and roosting habitats due to construction works and provision of access roads.	Medium negative/Moderate	Commuting route will be retained during construction.	Negligible/Negligible
		Disturbance to bats roosting elsewhere in the Habitat Area is likely, and disruption to bat activity due to vibration, noise and light is possible.	Medium negative/Moderate	Screens, no night working and pre-work surveys will reduce disturbance to bats.	Negligible/Negligible
		No pollution predicted due to absence of watercourses.	Negligible/Negligible	Generic mitigation will reduce impacts on bats.	Negligible/Negligible
	Operation	Direct mortality due to the severance of commuting routes along North Deeside Road and Culter house Lane if bats continue to fly across.	High negative/Major	Provision of crossing points at Milltimber Brae Overbridge, North Deeside Road and Milltimber Junction, linear screen planting along either side of the road and the road being in a cutting will reduce risk of bats flying into oncoming traffic, although distances between crossings will be large and bats may still attempt to fly across especially from roosts.	Low Negative/Minor
		Permanent loss of large roost including scarce maternity roost/hibernaculum conditions.	High negative/Major	Replacement on 1:1 basis and seeding of newly created roost with timber and droppings from the old roost as well as provision of heated bat boxes elsewhere in Milltimber will offset loss of roost although it will take bats some time to find and start using the new roost.	Medium Negative/Moderate
		Road will fragment urban area with foraging and roosting areas on both sides, but commuting routes will exist at North Deeside Road and Milltimber junction.	Medium negative/Moderate	Provision of crossing points will partly offset fragmentation of habitat but crossing points are far apart and some fragmentation is likely to remain with effective loss of resources either side of the road if bats cannot cross.	Medium Negative/Moderate

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
		Permanent disturbance to foraging and roosting habitats possible due to disturbance from road traffic and lighting at the junction but bats will gradually become accustomed to the disturbance which is unlikely to be significantly different from existing levels.	Low negative/Minor	Planting alongside the road will screen nearby trees and buildings and bats will gradually become accustomed to new scheme, with no long term impact on roosts.	Negligible/Negligible
		No pollution predicted due to absence of watercourses.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
S33 Milltimber	Construction	Direct mortality possible due to demolition of potential roosts in Milltimber Brae.	Medium negative/Moderate	Generic measures including further survey, licence application and soft felling will mitigate impacts on bats.	Negligible/Negligible
		Loss of potential roosts and associated urban foraging habitat due to demolition.	Low negative/Minor	Pre-demolition survey and replacement of roosts on 1:1 basis using bat boxes, heated bat boxes and planting will offset any roost or potential roost loss.	Negligible/Negligible
		Fragmentation of foraging and roosting habitats due to construction works and provision of access roads.	Medium negative/Moderate	Commuting route will be retained during construction.	Negligible/Negligible
		Disturbance to bats roosting elsewhere in the Habitat Area is likely, and disruption to bat activity due to vibration, noise and light.	Medium negative/Moderate	Generic mitigation and screens will reduce impacts on bats.	Negligible/Negligible
		No pollution predicted due to absence of watercourses.	Negligible/Negligible	Generic mitigation will reduce impacts on bats.	Negligible/Negligible
	Operation	Direct mortality due to the severance of commuting routes along North Deeside Road, Culter house Lane and Old Deeside Line (as per S31) if bats continue to fly across.	High negative/Major	Provision of crossing points at Milltimber Brae Overbridge, North Deeside Road and Milltimber Junction, linear screen planting along either side of the road and the road being in a cutting will reduce risk of bats flying into oncoming traffic, although distances between crossings will be large and bats may still attempt to fly across especially from roosts.	Low Negative/Minor
		Permanent loss of potential roosts and foraging habitat in area where alternative roosts exist.	Low negative/Minor	Replacement of roosts and provision of heated bat boxes elsewhere in Milltimber will offset loss of potential roost habitat although it will take bats some time to find and start using the new roost.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
		Road will fragment urban area with foraging and roosting areas on both sides, but commuting routes will exist at North Deeside Road and Milltimber junction.	Medium negative/Moderate	Provision of crossing points will partly offset fragmentation of habitat but crossing points are far apart and some fragmentation is likely to remain with effective loss of resources either side of the road if bats cannot cross.	Medium Negative/Moderate
		Permanent disturbance to foraging and roosting habitats possible due to disturbance from road traffic and lighting at the junction but bats will gradually become accustomed to the disturbance which is unlikely to be significantly different from existing levels.	Low negative/Minor	Planting alongside the road will screen nearby trees and buildings and bats will gradually become accustomed to new scheme, with no long term impact on roosts.	Negligible/Negligible
		No pollution predicted due to absence of watercourses.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
S34 Guttrie Hill	Construction / Operation	No direct mortality due to construction, habitat loss or pollution predicted due to distance of wood from scheme.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
		RTA risk and indirect fragmentation of habitats due to road passing between woodland and nearby Guttrie Wood, effective loss of either woodland and associated foraging habitat if bats cannot cross.	Medium negative/Moderate	Provision of crossing points and road being in a cutting will reduce risk of RTA and will partly offset fragmentation of habitat but crossing points are far apart and some fragmentation is likely to remain with effective loss of resources either side of the road if bats cannot cross.	Medium Negative/Moderate
S35 Milltimber Wood	Construction / Operation	No direct mortality due to construction, habitat loss or pollution predicted due to distance of wood from scheme.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
		RTA risk and indirect fragmentation of habitats due to road passing between woodland and nearby Guttrie Wood, effective loss of either woodland and associated foraging habitat if bats cannot cross.	Medium negative/Moderate	Provision of crossing points and road being in a cutting will reduce risk of RTA and will partly offset fragmentation of habitat but crossing points are far apart and some fragmentation is likely to remain with effective loss of resources either side of the road if bats cannot cross.	Medium Negative/Moderate
S36 Agricultural fields around Nether Beanshill	Construction / Operation	No significant impacts predicted due to lack of resources under alignment.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
S37 Woodland from Hill Farm to	Construction	No direct mortality predicted during construction due to absence of roosts under alignment.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
Westfield Lodge		Loss of woodland habitat in gardens at Beanshill along with associated shelter and foraging/commuting resource due to construction of overbridge.	Low negative/Minor	Generic mitigation and habitat creation will reduce habitat loss although it will take some time to mature.	Low negative/Minor
		Severance of commuting route due to construction of overbridge and removal of linear navigation link between roosts at Beanshill and alternative roosts/foraging areas in Milltimber.	Medium negative/Moderate	Commuting route will be kept open during construction.	Negligible/Negligible
		Disturbance of roosting and foraging bats due to proximity to roosts at Airy Park Lodge and Beanshill house roosts and woodland area.	Medium negative/Moderate	Generic mitigation including pre-work survey, no work during sensitive time of year and no night work will reduce disturbance if bats are roosting.	Negligible/Negligible
		No pollution predicted due to absence of watercourses.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
	Operation	No direct mortality due to RTAs due to provision of safe crossing point at Contlaw Road overbridge.	Negligible/Negligible	Crossing point at Contlaw Road Overbridge, with planting either side to direct bats over, will provide safe crossing over the cutting.	Negligible/Negligible
		Minimal permanent loss of woodland habitat in gardens at Beanshill along with associated shelter and foraging/commuting resource.	Low negative/Minor	Habitat loss will be offset by creation of mixed woodland with no overlal loss of habitat although this would take some time to mature and would be more fragmented than the existing resource.	Low negative/Minor
		Commuting route would be retained due to provision of Contlaw Road overbridge thus retaining linear navigation link between roosts at Beanshill and alternative roosts/foraging areas in Milltimber.	Negligible/Negligible	Crossing point at Contlaw Road Overbridge, with planting either side to direct bats over, will provide safe crossing over the cutting enabling bats to in the same way as current conditions.	Negligible/Negligible
		Some disturbance of roosting and foraging bats possible due to proximity of operational scheme to roosts at Airy Park Lodge and Beanshill house roosts and woodland area.	Low negative/Minor	Disturbance will be reduced by screening of properties.	Negligible/Negligible
		No pollution predicted due to absence of watercourses.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
S38 Improved fields	Construciton / Operation	No direct mortality due to construction or operation (due to road being in a cutting), habitat loss, disturbance or pollution predicted due to absence of resources under alignment.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
		Severance of infrequently used commuting route along an access track although alternative commuting routes will exist at Contlaw Road and along scheme.	Low negative/Minor	Provision of alternative routes alongside the road and crossing point at Contlaw Road Overbridge will reduce impacts and introduce new routes to Silverburn (north) and Milltimber (south) although net loss of commuting routes may mean bats have to travel further to reach resources either side of the road.	Low Negative/Minor
S39 Beans Hill	Construction / Operation	No direct mortality due to construction, habitat loss, disturbance or pollution predicted due to absence of resources under alignment.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
		Indirect severance as per S38 during operation.	Low negative/Minor	Provision of alternative routes alongside the road and crossing point at Contlaw Road Overbridge will reduce impacts and introduce new routes to Silverburn (north) and Milltimber (south) although net loss of commuting routes may mean bats have to travel further to reach resources either side of the road.	Low Negative/Minor
Section SL5					
S40 Agricultural fields around Silver Burn	Construction	No direct mortality predicted due to absence of roosts under alignment.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
		Loss of foraging and commuting habitat along road.	Medium negative/Moderate	Habitat creation including riparian scrub planting around the detention basins will provide alternative foraging habitat. Scrub to be lost at side of Silverburn Road will be replaced with no overall loss of foraging or commuting habitat.	Negligible/Negligible
		Severance and fragmentation of commuting habitats if construction compounds or access roads sever Silverburn road.	Medium negative/Moderate	Severance will be addressed by provision of safe crossing and linear planting along carriageway.	Negligible/Negligible
		Disturbance possible during construction due to the proximity of roosts including maternity roost at Silverburn House to proposed scheme if works compounds are located nearby.	Medium negative/Moderate	Generic mitigation and provision of temporary screening, no night works and sensitive siting of compounds will reduce disturbance during construction.	Negligible/Negligible
		Potential pollution impacts due to runoff from scheme into Silver Burn, Gairn Burn and Ord Burn and downstream impacts on foraging resources including Silver Dam.	Medium negative/Moderate	Generic mitigation will minimise the risk of pollution.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
	Operation	Direct mortality due to RTA s from severance of commuting route.	High negative/Major	Provision of safe crossing point along commuting route and linear planting on the embankment will minimise the risk of RTA.	Negligible/Negligible
		Permanent loss of foraging and commuting habitat.	Medium negative/Moderate	Linear planting including broadleaved and mixed woodland planting and riparian/scrub habitat on both sides of the scheme will offset habitat lost to scheme with no overall loss of foraging habitat.	Negligible/Negligible
		Severance and fragmentation of commuting habitats particularly where Silver Burn road crosses the proposed alignment, near maternity route and along green corridor.	High negative/Major	Provision of safe crossing point along commuting route and linear planting on the embankment to direct bats to the safe crossing will prevent severance and fragmentation along the wildlife corridor.	Negligible/Negligible
		Disturbance of commuting bats likely during operation of road due to severance of commuting route.	Medium negative/Moderate	Disturbance will be minimised by planting mixed woodland habitat either side of the road to act as a permanent screen to roosts.	Negligible/Negligible
		Potential pollution impacts due to runoff from scheme into Silver Burn, Gairn Burn and Ord Burn and downstream impacts on foraging resources including Silver Dam.	Medium negative/Moderate	Generic mitigation including provision of detention basins will minimise the risk of pollution.	Negligible/Negligible
S41 Silver Burn Wood	Construction / Operation	No direct impacts predicted due to distance from scheme.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
		Indirect severance due to the proposed scheme severing a commuting route along Silverburn Road and severance along a green corridor as per S40.	Medium negative/Moderate	Bats will be able to cross the operational road safely with the proposed crossings and linear planting alongside the road to direct bats toward safe crossings.	Negligible/Negligible
S42 East Silver Burn	Construction	No direct mortality predicted due to absence of roosts under alignment.	Negligible/Negligible	Generic measures will reduce impacts on bats	Negligible/Negligible
		Loss of foraging and commuting habitat if construction compounds insensitively located.	Medium negative/Moderate	No overall loss of foraging habitat predicted due to replacement with riparian and scrub habitat.	Negligible/Negligible
		Severance and fragmentation of commuting habitats if construction compounds or access roads sever Silverburn road.	Medium negative/Moderate	Bats will be able to cross the operational road safely with the proposed crossings and linear planting alongside the road to direct bats toward safe crossings.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
		Disturbance possible during construction due to the proximity of roosts to proposed scheme if works compounds are located nearby.	Medium negative/Moderate	Generic mitigation and no night works will reduce disturbance.	Negligible/Negligible
		Potential pollution impacts due to construction works located near Silver Burn, Gairn Burn and Upper Beanshill Burn.	Medium negative/Moderate	Generic mitigation will reduce impacts on bats.	Negligible/Negligible
	Operation	Direct mortality due to RTA s from severance of commuting route.	High negative/Major	Provision of safe crossing points will reduce RTA risk.	Negligible/Negligible
		Permanent loss of edge of Rotten O'Gairn DWS woodland and wet foraging habitats, and commuting habitat.	Medium negative/Moderate	No overall loss of foraging habitat predicted due to replacement with riparian and scrub habitat.	Negligible/Negligible
		Severance and fragmentation of commuting habitats particularly where Silver Burn road crosses the proposed alignment, near maternity route and along green corridor as per S40.	High negative/Moderate	Bats will be able to cross the operational road safely with the proposed crossings and linear planting alongside the road to direct bats toward safe crossings.	Negligible/Negligible
		Disturbance of commuting bats and disruption of foraging areas likely during operation of road due to severance of commuting route.	Medium negative/Moderate	Disturbance during operational scheme is likely to be minimal due to screening from newly created mixed woodland alongside the scheme.	Negligible/Negligible
		Potential pollution impacts due to runoff from to scheme into Silver Burn, Gairn Burn and Upper Beanshill Burn.	Medium negative/Moderate	Generic mitigation will reduce impacts on bats.	Negligible/Negligible
S43 Gairnhill and Kingshill Wood	Construction / Operation	No direct mortality during construction predicted due to absence of roosts under alignment.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
		RTA due to operation.	Medium negative/Moderate	Provision of safe crossing points and planting of linear mixed woodland habitat longside the road will reduce the likelihood of direct crossings and provide safe locations for bats to cross, although overall provision will be reduced and some bats may still attempt to cross.	Low negative/Minor
		Minimal loss of medium value roost and foraging habitat in south east of habitat area.	Low negative/Minor	Generic measures will reduce impacts on bats which may benefit from habitat creation on both sides of the scheme including broadleaved woodland planting.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
		Severance of commuting routes between wood and features to the west of the road and fragmentation of important wildlife corridor as per S40, S42.	Medium negative/Moderate (construction) High negative/Moderate (operation)	Severance of commuting routes will be mitigated as per S44 with provision of new commuting route and safe crossing points will partly reduce severance although overall provision for crossing road is less than current levels and journey times will be increased.	Low negative/Minor
		Disturbance of foraging activity in south east of Habitat Area due to clearance for construction and operation of road.	Medium negative/Moderate	Generic mitigation including no night works, safeguarding adjacent trees and minimisation of works area will reduce impacts on bats in construction, and linear planting will prevent light and noise disturbance on woodland edges during operation.	Negligible/Negligible
		Potential pollution of Upper Beanshill Burn due to spills and runoff.	Medium negative/Moderate	Generic mitigation will reduce impacts on bats.	Negligible/Negligible
S44 Agricultural fields to the west of Kingshill Wood.	Construction / Operation	No direct mortality during construction predicted due to absence of roosts under alignment. Direct mortality due to RTAs from severance of commuting routes during operation of the scheme.	Negligible (construction) Medium negative/Moderate (operation)	Provision of new commuting route and safe crossing points will partly reduce the RTA risk and the presence of the road in a crossing and raising of the embankment with barriers as per Landscape report will reduce RTA although overall provision for crossing road is less than current levels and small numbers of bats may continue to cross.	Negligible (construction) Low negative/Minor (operation)
		Minimal loss of foraging and commuting habitat due to construction and operation.	Low negative/Minor	With standard tree planting, retention of most important habitats and mixed woodland planting either side of the road no overall loss of valuable foraging habitat is predicted to occur.	Negligible/Negligible
		Severance and fragmentation of commuting routes between Gairnhill Wood (S43) and features to the west including Moss of Auchlea at the Gairnhill Access, Gairnhill Road and access to Moss of Auchlea.	Medium negative/Moderate (construction) High negative/Major (operation)	Provision of new commuting route and safe crossing points will partly reduce severance although overall provision for crossing road is less than current levels and journey times will be increased.	Low negative/Minor
		Disturbance of commuting bats likely during construction and operation of the scheme.	Medium negative/Moderate	Disturbance will be reduced by provision of barriers and screening as per Landscape report with minimal impacts on roosting and commuting bats predicted.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
		Potential pollution impacts due to spills and runoff from scheme into Silver Burn and Gairn Burn; potential hydrological impacts on Moss of Auchlea as per S45.	Medium negative/Moderate	Generic measures will reduce impacts on bats.	Negligible/Negligible
S45 Moss of Auchlea	Construction	No direct mortality predicted during construction due to distance from scheme.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
		No loss of foraging and commuting habitat due to distance from scheme during construction.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
		Temporary severance of commuting routes due to insensitive siting of works on commuitng routes between the Moss and Gairnhill Wood.	Medium negative/Moderate	Severance will be prevented by keeping flyways open during construction and sensitive location of works.	Negligible/Negligible
		Disturbance possible during construction due to the proximity of roosts to proposed scheme if works compounds are located nearby.	Medium negative/Moderate	Generic mitigation will reduce disturbance to roosting and foraging bats during construction.	Negliigible/Negligible
		Potential pollution and habitat modification due to spills into Moss of Auchlea during construction.	Medium negative/Moderate	Generic mitigation will minimise the risk of pollution of the Moss of Auchlea and watercourses.	Negliigible/Negligible
	Operation	Mortality due to RTA during operation of scheme if bats continue to cross between Moss and roost, and woodland areas.	High negative/Major	Newly provided commuting route and safe crossing points will reduce risk of RTA and planting on either side of the road will reduce chances of bats flying across road, but there may still be some bats attempting to cross due to long detour to crossing from roost at Moss Side of Auchlea.	Low negative/Minor
		Potential hydrological impacts on the Moss due to position of the road, and subsequent reduction in quality of foraging habitat in medium – long term.	High negative/Major	Generic mitigation, SUDS and provision for water to flow into the moss under road will reduce impacts on the scheme.	Low negative/Minor
		Indirect severance of commuting routes between the Moss and roost, and alternative roosts and foraging habitat at Kingshilland Gairnhill Wood to the east of the scheme.	High negative/Major	Provision of new commuting route will offset loss of route and bats are predicted to use the provided crossing in time, but some severance is predicted due to distance of safe crossing from existing route.	Low negative/Minor
		Disturbance of roosting, foraging and commuting bats due to light from operational scheme.	Medium negative/Moderate	Standard tree and mixed woodland planting on either side of the scheme will reduce operational impacts on the roost and foraging habitat in this HA's.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
		Potential pollution and habitat modification due to runoff from scheme into Moss of Auchlea.	Medium negative/Moderate	Generic mitigation will minmise the risk of pollution of the Moss of Auchlea and watercourses.	Negliigible/Negligible
Section SL6					
S46 Agricultural fields to the north of the A944	Construction / Operation	No direct mortality during construction predicted due to absence of roosts under alignment.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
		Direct mortality due to RTAs from severance of commuting route along a minor road near Cloghill and roost during operation of the scheme.	Medium Negative/Moderate	Provision of safe crossing enhanced with standard tree planting at Fairley Cloghill Overbridge will minimise the likelihood of direct crossings, and road in a cutting so bats less likely to collide with vehicles.	Negligible/Negligible
		Minimal loss of low value foraging and commuting habitat.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
		Severance of minor commuting route along the edge of West Hatton Wood during construction and operation.	Medium Negative/Moderate	Keeping flyways open during construction and provision of safe crossing point along commuting route will prevent severance of habitat and retain connectivity between habitat areas.	Negligible/Negligible
		Disturbance possible during construction due to the proximity of potential roost (1b) at Cloghill to proposed scheme if works compounds are located nearby. Disturbance of commuting bats likely during construction and operation of road due to severance of commuting route.	Medium Negative/Moderate	Generic mitigation measures including survey and screening if necessary will reduce disturbance to roosting bats during construction and operation.	Negligible/Negligible
		Potential pollution impacts due to spills and runoff at Westholme Burn.	Low negative/Minor	Generic mitigation including provision of detention basins will mitigate impacts on bats.	Negligible/Negligible
S47 West Hatton Woods DWS	Construction	Direct mortality due to felling of potential roost trees West Hatton Wood.	Medium Negative/Moderate	Generic mitigation will minimise the risk of direct mortality due to felling activity.	Negligible/Negligible
		Loss of high value foraging and commuting habitat with medium roost potential due to construction of road.	Medium Negative/Moderate	Loss of foraging and commuting habitat will not be mitigated for, although loss of roost habitat will be offset by provision of bat boxes either side of the scheme. There are likely to be impacts on the suitability of the site for populations of foraging bats.	Medium negative/Moderate

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
		Severance and fragmentation of high value commuting and foraging habitat.	Medium Negative/Moderate	Provision of commuting habitat during construction will retain routes, but woodland likely to be fragmented despite sensitive location of compounds and works accesses.	Medium negative/Moderate
		Disturbance possible during construction due to the proximity of known roost at Home Farm and potential roosts within Hatton Woods to proposed scheme if works compounds are located nearby.	Medium Negative/Moderate	Disturbance during construction will be reduced by generic measures; foraging and commuting habitat likely to be altered permanently by disturbance from traffic.	Low negative/Minor
		No potential pollution predicted due to absence of watercourses.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
	Operation	Direct mortality due to RTAs from severance of high value foraging and commuting site.	Medium Negative/Moderate	Provision of safe crossing point will reduce RTA risk but its location away from the woodland may mean bats may still attempt to cross.	Medium negative/Moderate
		Permanent loss of broadleaved woodland habitat.	Medium Negative/Moderate	Loss of foraging and commuting habitat will not be mitigated for, although loss of roost habitat will be offset by provision of bat boxes either side of the scheme. There are likely to be impacts on the suitability of the site for populations of foraging bats.	Medium negative/Moderate
		Severance and fragmentation of high value commuting and foraging habitat.	Medium Negative/Moderate	Severance of commuting route will be partly addressed by the provision of safe crossing points at Fairley Cloghill Overbridge but fragmentation will not be addressed with proposed habitat creation.	Medium negative/Moderate
		Disturbance of flight routes and feeding behaviour during operation due to severance and fragmentation of habitat.	Medium Negative/Moderate	Generic measures will reduce disturbance but bats likely to be affected by traffic noise in operation of the scheme.	Low negative/Minor
		No potential pollution predicted due to absence of watercourses.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
S48 Cloghill	Construction / Operation	No direct mortality during construction predicted due to absence of roosts under alignment although one building does have low roost potential (2b).	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
		Loss of low value bat habitat.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
		No severance, fragmentation or disturbance predicted due to the low suitability of habitat for bats.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
		No potential pollution predicted due to absence of watercourses.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
N1 Kingswell	Construction / Operation	No direct impacts predicted due to distance from scheme.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
N2 Agricultural fields north of Cloghill	Construction / Operation	No direct mortality during construction predicted due to absence of roosts under alignment.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
		No direct loss of habitat due to distance from scheme.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
		Severance and disturbance of commuting route at Fairley Home (assessed in N4) during construction and operation.	Medium Negative/Moderate		
		No potential pollution predicted due to absence of watercourses.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
N3 Derbeth Farm and agricultural land around Fairley Home Farm	Construction / Operation	No direct mortality during construction predicted due to absence of roosts under alignment. Direct mortality due to RTAs from severance of commuting route in north of habitat site.	Medium Negative/Moderate	Provision of safe crossing points and linear planting alongside the road will reduce the impacts of RTA; presence of road in a cutting will also deter bats from crossing away from crossing points.	Negligible/Negligible
		Loss of limited value foraging habitat.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
		Severance of commuting routes in north of HA.	Medium Negative/Moderate	Provision of safe crossing points will reduce severance by providing alternative commuting routes across scheme close to the existing ones.	Negligible/Negligible
		No disturbance of roosting bats likely during construction and operation due to distance of roost from road and construction works.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
		No pollution predicted due to absence of watercourses.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
N4 Woodland at Fairley Home	Construction	Direct mortality possible during construction if bats are roosting in trees to be felled.	Medium Negative/Moderate	Generic mitigation will minimise the risk of direct mortality due to felling activity.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
Farm and Derbeth Farm		Loss of high value foraging and commuting habitat and loss of Fairley Home Farm Pond and associated foraging habitat during construction.	High Negative/Moderate	Loss of roost habitat will be offset by provision of bat boxes either side of the scheme and like-for-like replacement of pond habitat will offset its loss, although the pond habitat will only be available to bats on the eastern side of the road. Habitat will take time to mature.	Medium negative/Moderate
		Severance and fragmentation of commuting route from known roosts at Fairley Home Farm and tree roosts of importance to myotis, brown long-eared and pipistrelle bats.	High Negative/Moderate	Provision of commuting habitat during construction will retain routes, but woodland likely to be fragmented despite sensitive location of compounds and works accesses.	Medium negative/Moderate
		Disturbance to foraging and roosting bats possible during construction due to the proximity of roosts at Fairley Home Farm to proposed scheme if works compounds are located nearby.	Medium Negative/Moderate	Disturbance during construction will be reduced by generic measures. Foraging and commuting habitat likely to be altered permanently by disturbance from traffic.	Low negative/Minor
		No pollution predicted due to absence of watercourses.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
	Operation	Direct mortality due to RTAs from severance of commuting route although road is in cutting.	Medium Negative/Moderate	Provision of safe crossing point will reduce RTA risk but the presence of the road on flat ground, not in a cutting, and the proximity of foraging resources either side of the road mean bats may still attempt to cross.	Medium negative/Moderate
		Direct loss of high value foraging and commuting habitat and loss of Fairley Home Farm Pond.	High Negative/Moderate	Loss of roost habitat will be offset by provision of bat boxes either side of the scheme and like-for-like replacement of pond habitat will offset its loss. Pond habitat will only be available to bats on the eastern side of the road. Habitat will take time to mature.	Medium negative/Moderate
		Severance and fragmentation of commuting route from known roosts at Fairley Home Farm and tree roosts of importance to myotis bats.	High Negative/Moderate	Severance of commuting route will be partly addressed by the provision of safe crossing points at Fairley Cloghill Overbridge and Derbeth Overbridge but fragmentation will not be addressed with proposed habitat creation.	Medium negative/Moderate
		Disturbance during operation of the scheme.	Medium Negative/Moderate	Generic measures will reduce disturbance but bats likely to be affected by traffic noise in operation of the scheme.	Low negative/Minor

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
		No pollution predicted due to absence of watercourses.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
N6 Woodland west of HIllhead of Derbeth Farm	Construction/Operation	No direct impacts predicted due to distance from scheme.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
N7 Woodland and shelterbelt east of Hillhead of Derbeth Farm	Construction / Operation	Potential direct mortality during construction predicted due felling of a tree roost and broadleaved and mixed woodland with roost potential.	High Negative/Moderate	Survey, licence application, exclusion, sensitive timing of felling and soft-felling techniques will minimise the risk of direct mortality during construction.	Negligible/Negligible
		Direct mortality due to RTAs from severance of commuting route along woodland edge during construction and operation.	High Negative/Moderate	Risk of RTA will be partly reduced by provision of safe crossings. Crossings will not be at the probable commuting route so there may still be a risk of RTA if bats continue to cross, without suitable planting to direct bats safely to the crossing.	Medium negative/Moderate
		Direct loss of high value foraging and commuting habitat north east of Dykeside, and of roost on shelterbelt.	High Negative/Moderate	Provision of like-for-like replacement for roost to be lost, and replacement of features of value in roost tree elsewhere in the woodland area will offset loss of habitat in this area.	Negligible/Negligible
		Severance and fragmentation of commuting route and high roost potential broadeave woodland.	Medium Negative/Moderate	Risk of RTA will be partly reduced by provision of safe crossings but crossings will not be at the probable commuting route so there may still be a risk of RTA if bats continue to cross, without suitable planting to direct bats safely to the crossing.	Medium negative/Moderate
		Disturbance possible during construction due to the proximity of roosts in woodland to proposed scheme if works compounds are located nearby and disturbance during operation of the scheme.	Medium Negative/Moderate	Disturbance suring construction and operation will be reduced by generic mitigation measures and screening although construction of the junction and increased human presence in the area cannot be mitigated for.	Low negative/Minor
		No pollution predicted due to absence of watercourses.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
N8 Scrub and braken on lower slopes of	Construction / Operation	No direct mortality predicted during construction due to absence of roosts under the scheme. RTA risk assessed as per N7.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
Brimmond Hill SINS		Minimal loss of foraging habitat at the edge of Brimmond Country Park.	Low negative/Minor	Habitat creation elsewhere in this section will reduce impacts of habitat loss. Although no specific habitat creation is proposed in this area, this is unlikely to have significant impacts in the long-term.	Negligible/Negligible
		No fragmentation predicted due to road passing eastern edge of the woodland/scrub.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
		Disturbance and disruption of bat activity in woodland area possible due to construction and operation of the road.	Medium negative/Minor	Generic mitigation measures will reduce impacts. Lack of barrier may mean long-term disturbance to small number of bats foraging in scrub.	Low negative/Minor
		No pollution predicted due to absence of watercourses.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible
N10 Agricultural fields south of C89c Overhills Farm	Construction/ Operation	No direct impacts predicted due to distance from scheme due to the low value of this site to bats.	Negligible/Negligible	Generic measures will reduce impacts on bats.	Negligible/Negligible

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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

EcIA – 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.

PART 2

FASTLINK

Contents

Tables

1 Introduction

1.1 General Background

1.1.1 This report is Part 2 of an additional survey report for the AWPR Environmental Statement 2007 (Jacobs 2007). The purpose of the report is to update and complete Appendix A25.3 and A40.3 of the Environmental Statement to include findings of bat surveys undertaken during summer 2007.

1.1.2 Part 2 provides baseline data for the Fastlink study area, including those obtained from surveys undertaken in the summers of 2006 and 2007, and presents a full assessment of impacts on all bat assemblages. Part 1 addresses the Southern Leg study area findings.

1.1.3 The three component route sections in this report for the Fastlink of the proposed scheme are as follows:

- Section FL1: Stonehaven to Howieshill (ch0-3200);
- Section FL2: Howieshill to Cookney (ch3200-6300); and
- Section FL3: Cookney to Cleanhill Junction (ch6300-10200).

1.1.4 All tables and figures are structured in this manner.

1.1.5 The Ecological Impact Assessment (EcIA) was undertaken with regard to the 'Design Manual for Roads and Bridges (DMRB) Volumes 10 and 11 (Highways Agency, 2001) and the Environmental Impact Assessment (Scotland) Regulations 1999, and with cognisance of Institute of Ecology and Environmental Management (IEEM 2006) guidelines.

1.1.6 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

1.1.7 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 local bat populations 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, pers. comm.), 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, although the population status of this species in the region is currently unclear (Rob Raynor, SNH, pers.comm.), and Leisler's bats have been recorded foraging near Peterculter (Rydell et al., 1993). 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 species level although certain features such as woodland edges and freshwater pools support high densities of insects and are therefore often focal points for foraging bats (Walsh and Harris, 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. Bats hibernate between late October and March. This requires an unexposed 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 Bats are conferred legal protection through international and national statutes which recognise the ecological value of these species and provide protection or promote policies that guide their conservation.

1.2.8 All British bat species are listed on Schedule 5 to the Wildlife and Countryside Act (1981) (as amended) (WCA) and protected under Section 9. 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 WCA. In Scotland the WCA has been amended by the Nature Conservation (Scotland) Act 2004 which extends the legal protection afforded to Schedule 5 species including 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.

1.2.9 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.

1.2.10 The WCA and Habitats Regulations also enact the Council of Europe Convention on European Wildlife and Natural Habitats (the Bern Convention 1979) and the Convention on the Conservation of Migratory Species of Wild Animals (the Bonn Convention 1980) to which the UK is a signatory. All species of bat, except for the common pipistrelle, are listed on Appendix II of the Bern Convention, and the Bonn Convention led to The Agreement on the Conservation of Populations of European Bats (EUROBATS).

1.2.11 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.

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

1.2.12 The UK Biodiversity Action Plan (BAP) is the UK government's response to the Convention on Biological Diversity. The UK BAP sets out a programme of action to conserve and enhance biological diversity throughout the UK. Local Biodiversity Action Plans (LBAPs) integrate these measures at the local or regional level. As part of the UK and local BAPs, Species Action Plans (SAPs) have been developed to guide conservation action for the ecological feature concerned. The establishment of a SAP reflects the fact that the species concerned is in a sub-optimal state

and requires conservation action. 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 UK BAP) for the species concerned.

1.2.13 *P. pipistrellus* and *P. pygmaeus* are priority species identified in the UK BAP and have a combined national SAP (Hutson, 1993) 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 and loss of suitable habitat and flyways as well as disturbance of roosts and loss of maternity and winter roost sites in buildings and trees. The UK BAP presents the following targets to which the proposed scheme must have regard:

- 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.

1.2.14 The North East Scotland Biodiversity Action Plan contains a LBAP for Daubenton's bat which serves to highlight the need to protect this locally important species which, despite its widespread distribution over the country, is threatened by roost loss and changes in riparian vegetation and water quality (Racey, undated). The LBAP presents a number of targets toward which the proposed scheme must contribute:

- promote sympathetic management of habitats; and
- maintain up to date records and information on Daubenton's bat and its habitat through monitoring.

1.2.15 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.

1.2.16 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. In particular only a small number of roosts is known for Natterer's bat which is near the northern edge of its range. Nathusius' pipistrelle is believed to be rare and no breeding colonies are known this far north (Sue Swift, University of Aberdeen, pers. comm.). Leisler's bats are considered a vagrant species in Aberdeenshire and no breeding colonies are known this far north.

2 Approach and Methods

2.1 Consultation

2.1.1 Previous survey data and records are important to consider 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 which appeared to be of potential value to bats. This allowed the identification and prioritisation of areas requiring surveys and assessment of potential 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 and methods used were determined through professional judgement, best practice guidelines (Mitchell-Jones, 2004; Mitchell-Jones and McLeish, 2004; Roche et al., 2005 and Russ et al., 2006) and through advice from SNH at a meeting on 8th 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 scale 1:10,000 scale GIS map sheets, which formed the basis for the results (Figures 40.4a–f and 40.5a-f).

Study Area

2.2.3 The study area for field surveys was defined with regard to specified standards (Highways Agency, 2001) and consideration was given to the seven species likely to be present (Davidson, 2004; 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 (Highways Agency, 2001), the final survey 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 access constraints (see Section 2.6), bat surveys were undertaken over two survey periods (2006 and 2007) and evening surveys at roosts and potential roosts were prioritised up to 200m from the road and where bats were considered most likely to be present.

Habitat Profiling

2.2.5 Where access was permitted, all habitat features including woodlands, water features, farm- and 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 foraging, commuting and roosting bats (Jenkins et al., 1998; Walsh and Harris, 1996a 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 enable focusing of survey effort.

Potential Tree Roosts

2.2.8 All isolated mature broadleaved 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 summer 2006 and 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 to a roost potential category according to the criteria outlined below 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 direct evidence of current use by bats.	Buildings/man-made structures with direct 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 man-made buildings and structures including farm buildings, private residences, outhouses, ice-houses, bridges, culverts, memorials and walls which could be potential roosts were carried out according to the criteria in Table 3.

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). No underground structures such as caves and mines are known to be present in the study area.

Activity Assessment

2.2.12 Activity surveys for the study area were carried out between June and early August 2006 and between May and July 2007 during the most active time of the year for bats.

2.2.13 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 and frequency division techniques. Bat Box III, Pettersson D230, Stag bat boxes and Duet detectors were used for heterodyne techniques, and AnaBat SD1 CF Bat Detectors were used for frequency division techniques. Bat calls were interpreted by surveyors in the field or in the office. Activity data including the species, location, and behaviour (including foraging, commuting, social calling) were recorded onto field maps and recording forms.

2.2.14 Evening emergence surveys: buildings identified as category 1a, 1b (roosts) and 2a (high potential roosts) during daytime surveys and which were prioritised as per Section 2.2.4, were monitored

from 20 minutes before sunset and up to 2 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 2.6). 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 where possible when conditions were 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.

2.2.15 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. All activity surveys were completed during the 2006 survey period, however the majority of the commuting route surveys were carried out during the 2007 survey period. Any records of commuting bats were made during activity surveys and from those commuting route surveys that were completed.

2.2.16 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.

2.2.17 Teams of up to two surveyors walked at a slow speed, stopping for two minutes where bats were observed, or at least every 100m, in order to sample activity. 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. 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.

2.2.18 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 involved a combination of manual and static (AnaBat SD1) bat detection techniques to identify the species, number and direction of bats at the potential crossing point or in the point likely to be affected by works. Manual techniques were undertaken in the evening only whereas AnaBat surveys were undertaken throughout the night.

2.2.19 Further activity surveys were undertaken at a number of buildings to determine their use by bats in the autumn and the possibility of their use in the winter, based on indications of their usage in the summer and their proximity to the proposed scheme. The buildings subjected to autumn surveys were: New Mains of Ury, Burnside, North Cookney Croft, barns in Cookney, North Cookney Mains, a bungalow in Cookney and North Rothnick Farm, which were all identified as having roosts or roost potential during summer surveys. Autumn 2006 surveys were undertaken on 17th and 18th October and 7th November and buildings were surveyed once in the evening and once at dawn according to the timings above. Culverts on Megray, Limpet and Back Burns, the Burn of Blackbutts, South Rothnick and East Crossley were also checked for the presence of bats.

2.2.20 In addition, further survey effort was used to establish whether there is a population of Leisler's bats in Aberdeen which could potentially be impacted by the proposed scheme. A car transect

survey following methods outlined in Roche et al. (2005) and Russ et al. (2006) was developed to provide coverage of the entire route of the proposed AWPR using frequency division techniques to record bat activity. The transects commenced shortly after sunset and involved a slow (20mph) driven transect with a bat detector aimed upwards out of the car window. The species, time and GPS location of bat activity was recorded.

2.2.21 The level of survey effort for the activity and commuting route surveys varied as a result of access restrictions and to gain enough information on certain areas where high levels of activity were anticipated as a result of high roosting, foraging and commuting potential. For this reason, areas such as the Burn of Muchalls and Elrick Ponds were surveyed on more than one occasion.

Survey Weather Conditions

2.2.22 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 Refinements to Survey Methods

2.3.1 Two parts of the study area were surveyed twice; these were surveyed in 2006 but were supperseded 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 2006/2007 (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. Car transect surveys were undertaken along public roads following the route of the proposed AWPR from south to north, and occasionally extended beyond the 500m corridor where the road continued outside the study area. The first available opportunities for returning to the study area were taken in each case.

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 2006/2007 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 2006/2007 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 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 2006/2007 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 for focusing of survey effort on the assessment of fragmentation and severance impacts on bats, it was agreed with SNH that separate commuting route surveys were undertaken as part of the bat activity surveys.

2.3.9 There were slight differences in the timing of bat activity surveys with respect to time of day during the 2006/2007 survey period to better reflect 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 (Highways Agency, 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 2006/2007 survey periods. Surveys were undertaken during the optimal emergence/swarming times and concentrated on identification of bat roosts where impacts on bats were considered more likely or where the buildings were closer to the proposed road.

2.3.11 The methodology used to identify areas of bat activity was altered to reflect the change in survey effort to identify commuting routes based on SNH recommendations. The 2004 survey method followed a walked transect based loosely on potential habitat areas while simultaneously identifying connecting routes between them. The 2006 surveys focused exclusively on identifying key bat habitat areas. The identification of commuting routes between these areas of habitat was established through separate survey effort using manual and remote bat detector surveys as above in 2006/2007. The methodology followed in 2006/2007 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 the Terrestrial Habitats report in Appendix A40.1 of the AWPR Environmental Statement 2007 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 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).

2.4.4 Using the information from Table 1, the relative importance of local bat populations for the seven species of bats present or possibly present in Aberdeen has been evaluated as follows:

- International importance – Habitats Directive Annex II species (none of the species listed in Annex II occur in Aberdeenshire);

- National importance – rare in Scotland, rare in Britain as specified in the Red Data Book; UK BAP species for which SAPs recommend safeguard of all sites; this includes the Leisler's bat;
- Regional importance – Nationally scarce; rare in the North East Coastal Plain Natural Heritage Future.
- County importance – Rare in Aberdeenshire; LBAP species for which the safeguard of all sites is a SAP recommendations; species for which the LBAP identifies the need to protect all populations above a certain size; this includes Nathusius' pipistrelle for which there is little data.
- Local importance – Restricted distribution or scarce in Aberdeenshire, but not threatened or rare. National priority BAP or LBAP species that are not rare in Aberdeenshire and for which the safeguard of all sites is not a SAP recommendation. This includes the common pipistrelle, soprano pipistrelle, Daubenton's bat, and although they are not BAP species, brown long-eared bat and Natterer's bat.

2.4.5 The value attributed to a feature or 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. roosting, 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) assessed according to the methods described in Table 2.

2.4.6 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).

2.4.7 In addition, consideration has also been given to any conservation designations, desk study results and a review of available literature. The evaluation of features is 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)	Habitats 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. Species Any regularly occurring population of an internationally important species, which is threatened or rare in the UK, i.e. a UK Red Data Book species or listed as occurring in 15 or fewer 10km squares in the UK (categories 1 and 2 in the UK BAP) or of uncertain conservation status or of global conservation concern in the UK BAP. A regularly occurring, nationally significant population/number of any internationally important species.

Ecological Importance	Attributes of Ecological Receptor
National (Scottish)	Habitats 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. Species A regularly occurring, regionally or county significant population/number of an internationally/ nationally important species. Any regularly occurring population of a nationally important species that is threatened or rare in the region or county (see local BAP). A feature identified as of critical importance in the UK BAP.
Regional (North East Scotland)	Habitats Sites 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. Species Any regularly occurring, locally significant population of a species listed as being nationally scarce which occurs in 16-100 10km squares in the UK or in a Regional BAP or relevant SNH Natural Heritage Future area on account of its regional rarity or localisation. A regularly occurring, locally significant population/number of a regionally important species. Sites maintaining populations of internationally/nationally important species that are not threatened or rare in the region or county.
Authority area (e.g. County or District) Aberdeenshire /City of Aberdeen	Habitats Sites that are recognised by local authorities e.g. Sites of Interest for Nature Conservation (SINCs) 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. Species 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.
Local (Immediate local area or village importance)	Habitats 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. Species 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.
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 In the assessment of significance of impact, consideration has been given both to the magnitude of impact and to the sensitivity of the receiving environment or species. The sensitivity of a feature was determined with reference to its level of importance although other elements have been taken into account where appropriate. Methods of impact prediction used indirect measurements, correlations, expert opinion, and information from previous developments. Impacts include those that are predicted to be direct, indirect, temporary, permanent, cumulative, reversible or irreversible.

Impact Magnitude

2.5.2 The magnitude of an impact has been assessed for each element of the development. A definition of the magnitude impacts is presented in Table 5 and includes positive impact criteria in accordance with IEEM guidance (2006). The magnitude of each impact was assessed independently of its value or statutory status.

Table 5 – Impact Magnitude

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

Impact Significance

2.5.3 The significance of an impact was determined according to the matrix of importance and magnitude as illustrated in Table 6.

Table 6 – Impact Significance

Magnitude / Importance	High Negative	Medium Negative	Low Negative	Negligible	Positive	High Positive
International	Major	Major	Moderate	Negligible	Moderate	Major
National	Major	Major	Moderate	Negligible	Moderate	Major
Regional	Major	Moderate	Minor	Negligible	Minor	Moderate
County	Moderate	Moderate	Minor	Negligible	Minor	Moderate
Local	Minor	Minor	Minor	Negligible	Minor	Minor
Less than Local	Minor	Negligible	Negligible	Negligible	Negligible	Negligible

2.5.4 The level of significance of impacts predicted on ecological receptors is an important factor in influencing the decision-making process and determining the necessity and/or extent of mitigation measures. Impacts can be beneficial or adverse, either improving or decreasing the ecological status, health or viability of a species, population or habitat. In general, an impact significance greater than or equal to Moderate would require specific mitigation to be undertaken to ameliorate the impact significance to acceptable levels.

2.6 Limitations to Assessment

Health and Safety

2.6.1 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 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

2.6.2 A limited number of buildings were inspected internally for the presence of bats, due primarily to the difficulty of obtaining homeowner permission and the impracticalities of surveying every building internally. One area in the Fastlink (West Stoneyhill) was not surveyed during the evening due to denial of access by a landowner.

Surveyor Expertise

2.6.3 All survey work was supervised by at least one of the following ecologists with suitable bat survey experience:

- Claire Hopkins (Ecologist, Jacobs) – licensed bat worker, 4 years experience with bat surveys;
- Graham Rankin (Senior Ecologist, Jacobs) – 5 years experience with bat surveys;
- Jonathan Guarnaccio (Senior Ecologist, Jacobs) – licensed bat worker, 5 years experience with bat surveys;
- Richard Roe (Senior Ecologist, Jacobs) – licensed bat worker, 5 years experience with bat surveys;
- Mark Jackson (Ecologist, Jacobs) – 3 years experience with bat surveys;
- Katie Finlinson (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

2.6.4 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 ºC, with an average of 10 ºC. July daytime temperatures were above the seasonal average, and night survey temperatures ranged from 12 – 22 ºC, with an average of 15 ºC. 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 ºC, with an average of 11 ºC. In the 2007 survey period the weather conditions were very varied, with daytime temperatures frequently below the seasonal average, and evening temperatures ranging from 8 - 15ºC, often with mist, light rain or wind.

Roost Location

2.6.5 While staining 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 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 the 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.

Detecting low numbers or the absence of bats

2.6.6 Bats are extremely mobile and while it is easy to demonstrate their presence in an area it is extremely difficult to demonstrate absence. Further survey effort may be needed in woodland and built environments with bat roost potential where bats were not shown to be present in the 2006/2007 surveys to confirm their absence prior to construction (see Mitigation section below).

3 Baseline

3.1 Consultation Information

3.1.1 The NESBReC and the University of Aberdeen provided no recent data for the study area, although Aberdeen University has published a number of scientific papers of studies undertaken in the Aberdeenshire area (e.g. Rydell et al., 1994). The Aberdeen Bat Group provided no roost details in the study area, although a number of roosts are known to be located in Peterculter and Milltimber to the north of the study area.

3.1.2 A Leisler's bat 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 south west 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. No further information on Leisler's bats and their presence in Aberdeen has been found since (pers. comm. Prof. Paul Racey, Aberdeen University).

3.2 Survey Results

3.2.1 This section of the report and Figures 40.4a-f and 40.5a-f present the main findings of field surveys.

3.2.2 Survey results are presented using a spatial framework based on a series of Habitat Areas that are defined in Appendix A40.1 (Terrestrial Habitats) in the AWPR Environmental Statement 2007. Isolated areas of habitat such as waterbodies or wetland areas that 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 Habitat Areas have been identified regardless of whether or not bats were observed using them.

3.2.3 Bat activity data are presented separately on graphics and tables, but have been incorporated into the descriptions of features of interest to bats. Bat activity recorded outside the study area has been included in the survey results and on figures only to identify 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.

3.2.4 Figures 40.5a-f also show habitat of general value to bats including woodland, linear features, waterbodies and wetland areas. Confirmed roosts and features with roost potential are identified with their suitability/roost potential category. 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.

3.2.5 Areas where no bat activity is shown on the figures are 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. This limitation is identified in Section 2.6 above. 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.

Summary of Baseline Survey Coverage and Omissions

3.2.6 Figures 40.4a-f 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. A number of potential commuting routes were identified across the study area, most of which were surveyed in 2007. Of the 20 potential commuting routes identified, eight were surveyed once in 2006 and resurveyed in 2007. The remaining 12 were surveyed in 2007.

3.2.7 Due to access restrictions, a few of the buildings/properties within the study area were not surveyed during the day to determine their potential for roosting bats. If they are to be directly impacted by the proposed scheme, these buildings will require daytime surveys prior to construction (refer to Section 2.6). If they are identified as roosts or potential roosts they will also require emergence surveys .All buildings surveyed and their roost potential category are indicated on Figures 40.5a-f.

3.2.8 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.

3.2.9 Where no bat activity is shown on the figures this 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.

Section FL1

3.2.10 This section is characterised by large open and exposed areas of farmland along the eastern side of the corridor which are of limited value to bats with the exception of linear features such as scrub lined tracks and field boundaries. The rest of the section is made up of areas of broadleaved, mixed and coniferous plantation woodland and heathland. A shelterbelt composed of mature broadleaved trees runs adjacent to and to the west of the B979, connecting with Slicewells Wood to the north and an area of mixed woodland on White Hill, as well as to the valley at Cowie Water. This provides excellent foraging and roosting habitat suitable for all Aberdeenshire bat species. Megray Burn flows north-south through Section FL1, through Megray Wood, which is composed of coniferous plantation in the north and mixed willow and birch wet woodland and marsh in the south. The habitat edges and burn are of value to foraging and commuting bats. Limpet Burn, which joins Megray Burn within the woods, also forms a valuable linear feature connecting potential roost sites and foraging areas both inside and outside the study area. To the north of the Section is an area of scrub and heathland at Fishermyre which provides some sheltered foraging opportunities to the east of the B979.

3.2.11 This section includes four identified roosts in farm buildings at New Mains of Ury (two roosts for soprano pipistrelle bats which are also used in the autumn). Recent evidence of droppings was identified at Forrester's Croft and Megray Farm Steading, although no emergence surveys were undertaken to confirm these due to the distance from the proposed scheme.

3.2.12 Daytime surveys identified a further seven potential roosts (six category 2a and one category 2b); emergence surveys were carried out at three of these but no bats were observed. Two culverts over Megray Burn and Limpet Burn have medium roost potential although surveys in summer and autumn 2006 did not reveal any signs of bats. Potential tree roosts were identified within the shelterbelt along the B979, within the southern portion of Megray Wood and along the valley sides adjacent to Limpet Burn.

3.2.13 A total of 209+ bat passes were recorded during the 2006 activity surveys. Of these passes, 158+ were foraging bat passes and 28 were commuting bat passes. Twenty three were commuting/foraging passes attributed to common and soprano pipistrelles. Commuting routes were identified: along Megray Burn, where bats travel north-south and south-north along the track between Megray Farm and Forester's Croft: in several places along the B979 where there is woodland adjacent to the road where bats commute north and south; along the edges and ride within Megray Wood; and along Limpet Burn. Foraging areas were identified along the shelterbelt beside the B979, around New Mains of Ury Farm and Steading, along Limpet Burn, around Megray Wood and to the north beside the junction between Fishermyre Wood and the woodlands to the north of Fishermyre.

3.2.14 Six potential commuting routes were identified during daytime surveys in 2006 along the B979 (based on 2006 activity surveys), Megray Burn and Megray access road, Limpet Burn, road through Megray Wood, Green Burn and road Fishermyre.

3.2.15 A total of 158+ bat passes was recorded during the 2006/2007 manual commuting route surveys in this Section. All of these passes were from common and soprano pipistrelles and at least 20 were from commuting bats. Static AnaBat SD1 CF Bat Detectors recorded 450 bat passes from species including common (220 passes), soprano pipistrelles (185 passes) and probable Daubenton's bats (4 passes) between the six potential commuting routes (see Table 9). The B979, Megray Burn, the road through Megray Wood, Limpet Burn and the road at Fishermyre were all confirmed as supporting bat commuting routes in the manual surveys; activity recorded along the other potential commuting routes may have been foraging activity.

3.2.16 The results from bat surveying of Section FL1 are shown in Table 7, Table 8 and Table 9, and in Figures 40.4a-b and 40.5a-b.

Table 7 – Specific Features Within Section FL1

Habitat Area	Feature	Feature Type	Description / Additional information
F1	Agricultural fields between the A90 and Stonehaven	Potential commuting along railway sidings and road	Series of agricultural fields with scattered scrub and low overall value to bats. Scrub, rank grassland and tall ruderal vegetation along the railway line provide limited foraging and commuting potential, due to high exposure levels. Amenity planting along the A90 also provides a potential commuting route of medium value, connecting potential roosts in Stonehaven with foraging habitat to the north, although the road may act as a barrier to direct crossings.
F2	Agricultural fields west of New Mains of Ury	Foraging area, potential roosting and commuting route	Large expanse of agricultural fields with low overall value to bats. Relatively species rich broadleaved shelter belts between fields and the road offer high commuting, roosting and foraging potential with several trees containing splits, cracks, loose bark, dead and missing limbs. Common pipistrelles recorded foraging along the length of the shelterbelt beside the road, which also represents a probable commuting route between the roosts at New Mains of Ury (F3) and foraging opportunities at Megray Wood and Limpet Burn (F7) and Slicewells Wood (F5) as per F5.
F3	Agricultural fields to the north of Megray Farm	Four building roosts, potential roosts, foraging and commuting routes, potential hibernation roost	Extensive area of arable fields with occasional scattered scrub are of low value to bats. Megray Burn is a commuting route for a small population of pipistrelle bats and the scrub-lined farm access track over the burn may also provide a commuting route between the roost at Megray Farm and foraging areas at the Burn and Megray Wood. New Mains of Ury Farmhouse was identified during emergence survey as a soprano pipistrelle roost with mature trees in the garden being used for foraging. At least six bats were recorded emerging from the corner of a barn in June 2006 and others were recorded foraging. The roost is also used in the autumn as two soprano pipistrelles were observed emerging in the October evening survey, and the buildings are strategically located within commuting distance (around 500m) from Cowie Water which is a deep, sheltered, wooded glen likely to provide excellent quality foraging habitat. New Mains of Ury Farm has one building identified as a common pipistrelle roost and one building identified as a potential roost. Megray Farm Steading and Forester's Croft were both identified as roosts with recent evidence of use during day surveys (category 1b). New Mains of Ury Cottages and Megray Farm are potential roosts (category 2a). One stone culvert on Megray Burn has medium potential as a roost.
F4	Woodland to the north-west of Megray Farm	Potential commuting route, foraging	Small pocket of relatively mature plantation woodland forms part of a pipistrelle bat commuting route along Megray Burn as per F3. The roosting potential of the trees is generally low although pipistrelle bats were observed foraging at the woodland edges which provides some shelter in an otherwise exposed area.
F5 (part)	Fishermyre Wood	Commuting route, potential tree roosts and foraging	A thin section along the eastern edge of this woodland is within the study area. The woodland as a whole is of high potential for foraging, roosting and commuting to all bat species as per F2, and is connected to known roosts at New Mains of Ury (F3) by a shelterbelt adjacent to F2. Common and soprano pipistrelles were recorded commuting along the woodland edge.
F6	Megray Wood	Commuting and foraging route, potential roost	Mature conifer plantation dominated by Sitka spruce provides low roosting potential. Potential commuting and foraging routes include Megray Burn, which runs through the uphill section, and open rides within the woodland, in addition to the plantation edges. The Habitat Area extends the more open and diverse foraging habitat along Limpet Burn (F7). Foraging and commuting common pipistrelle were identified along the northern and southern edges of the plantation and along one of the rides. Other edges are likely to be used in a similar manner. No commuting was recorded along the road through

Habitat Area	Feature	Feature Type	Description / Additional information
			Megray Wood in commuting route surveys in 2007 although many pipistrelle bats were observed foraging, and small numbers of commuting bats were observed in 2006. A culvert with medium roost potential, but no signs of bats, was identified under the road on Limpet Burn.
F7	Limpet Burn	Commuting, foraging, potential tree roosts	Mosaic of semi-natural communities including a dense marsh with scattered willow, birch woodland, dense bracken and continuous gorse provide high value foraging and commuting, connecting the fish ponds at the trout fishery and the potential roost (category 2a) at Logie Farm, with the scrub woodland and with the burn itself. The valley sides along the burn also provide additional shelter with several old, dead and damaged trees providing potential roost sites (category 2a). Common and soprano pipistrelle and Myotis sp. (presumed Daubenton's bats) were recorded foraging and commuting along the length of the burn in this Habitat Area during evening activity and commuting route surveys in 2006 and 2007.
F8	Agricultural fields surrounding Coneyhatch and Wyndford Farm	Potential roosts, commuting route	Series of arable and improved fields, with occasional marshy grassland and scattered scrub with low value to foraging and commuting bats. Linear features including tracks and field boundaries have commuting potential. A commuting pipistrelle bat was recorded along the gorse lined road in 2006 activity surveys and foraging activity was recorded using static detectors along Green Burn during the 2007 survey period. The houses at Coneyhatch farm, Standingstones and Wyndford were assessed as being of potential roost category 2a; Kempston Hill and Howieshill were assessed as being category 2b. A roost emergence survey at Coneyhatch Farm revealed no bats emerging.
F9	Kempstone Hill	n/a	Scrub and heath at Kempstone Hill provides limited potential for foraging and commuting due to high levels of exposure.
F10	Fishermyre Wood South	Commuting and foraging, potential roost	Semi-natural broad-leaved woodland composed provides ideal foraging and commuting habitat of high potential value. The rest of the Habitat Area is composed of scrub and heath with limited commuting or foraging potential due to higher exposure levels. Due to access restrictions the interior of the woodland was not surveyed but along the road on the northern edge of the Habitat Area both foraging and commuting common and soprano pipistrelle were recorded. The road along the northern edge of the wood is likely to be a commuting route used by common and soprano pipistrelle bats, and Daubenton's bats were also recorded foraging as per F12 connecting foraging and roosting areas in Fishermyre and at the Burn of Muchalls in an otherwise open area. The farmhouse at Fishermyre is a potential roost (category 2a) however no bats were observed during the emergence survey in 2006.
F11	Fishermyre Wood North	Commuting and foraging	Mixed woodland with silver birch along the edges and Scots pine plantation in the middle provides some sheltered foraging and commuting habitat with common pipistrelle identified along the B979 as per F5.

Table 8 – Bat Activity Results for 2006 Section FL1

Grid Reference	Habitat	Species	Number of Bat Passes	Activity1	Notes
NO 874 888	Megray Wood	Soprano Pipistrelle	5	C	Along road between woodland
NO 876 889	Limpet Burn	Soprano Pipistrelle	12	F	Following burn / valley in both directions
NO 878 888	Limpet Burn	Common + Soprano Pipistrelle	26	F	Following burn / valley in both directions. 18 Common / eight Soprano.
NO 879 888	Limpet Burn	Common Pipistrelle	6	F	Along valley
NO 880 888	Limpet Burn	Common Pipistrelle	15	F	Two bats, lots of passes, localised foraging.
NO 879 888	Limpet Burn	Common Pipistrelle	30+	F	Regular / constant foraging along burn in both directions.
NO 879 888	Limpet Burn	Common Pipistrelle	6	F	Foraging in both directions.
NO 878 888	Limpet Burn	Common Pipistrelle	2	F	Single pipistrelle foraging around trees on edge, localised foraging.
NO 876 888	Limpet Burn	Common Pipistrelle	6	C/F	Two Commuting four Foraging west at ~2m
NO 875 888	Megray Wood	Common Pipistrelle	1	C	Flying east
NO 873 887	Megray Wood	Common Pipistrelle	3	C	One flying east, one flying west
NO 873 889	Road	Common Pipistrelle	1	F	Foraging east and west along road
NO 869 890	Shelterbelt, Megray Wood	Soprano Pipistrelle	1	C	Along shelterbelt at ~ 3m
NO 871 888	Shelterbelt, Megray Wood	Common Pipistrelle	2	C	Along shelterbelt at ~2m
NO 871 887	Shelterbelt, Megray Wood	Soprano Pipistrelle	1	C	Along shelterbelt
NO 871 884	Shelterbelt, Forester's Croft	Common Pipistrelle	3	F	At ride in shelterbelt where telewires cross. Flying at ~ 5m
NO 871 882	Shelterbelt	Common Pipistrelle	2	F	Around edges of shelterbelt ~ 2m
NO 871 881	Shelterbelt	Common Pipistrelle	2	C/F	Around edges of shelterbelt at ~ 2m
NO 871 880	Shelterbelt	Common Pipistrelle	2	F	In field on opposite side of shelterbelt from road flying at ~ 3m
NO 872 879	Polbare Belt	Common Pipistrelle	12	F	Foraging above road overhead at 4-5m

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

Grid Reference	Habitat	Species	Number of Bat Passes	Activity1	Notes
NO 872 876	Road	Common Pipistrelle	3	F	Two bats foraging over road at ~3m
NO 871 875	Road	Common Pipistrelle	3	F	Two bats foraging over road 2m
NO 874 879	Megray Burn	Common Pipistrelle	1	C	One bat flying south to north near top of wood along Megray Burn at ~ 3m
NO 877 876	Road	Common Pipistrelle	2	C	One bat commuting along road from farm 3-4m
NO 877 878	Hedgeline	Common Pipistrelle	1	F	One bat feeding along hedge
NO 874 885	Wood	Soprano Pipistrelle	7	F	Two bats feeding at edge of wood, overhead 3-4m
NO 871 891	Megray Burn	Common Pipistrelle	1	C	Along Megray Burn near woodland edge
NO 866 899	Tree lines	Common Pipistrelle	8	F	Tree lined lane
NO 866 898	Tree lines	Common Pipistrelle	7	C	Tree line
NO 866 899	Tree lines	Common Pipistrelle	6	F/C	Tree lined road commuting both sides
NO 866 898	Tree lines	Common Pipistrelle	1	C	Tree lined road
NO 866 899	Tree lines	Soprano Pipistrelle	7	F	Tree lined route
NO 867 899	Tree lines	Soprano + Common Pipistrelle	9	C/F	Along both sides of tree lined road
NO 869 903	Scrub lined road	Soprano Pipistrelle	1	F	Along road
NO 867 900	Shelterbelt	Common Pipistrelle	3	F	Two bats foraging
NO 866 901	Road	Common Pipistrelle	1	C	Along road
NO 864 903	Road	Common Pipistrelle	1	C	Along road
NO 866 899	Road	Common Pipistrelle	1	C	Along road

Table 9 – Results of 2007 Commuting Route Surveys, Section FL1

Transect Area Name	Megray Burn		Farm Access track Megray		Limpet Burn		Road through Megray Wood		Green Burn		Fishermyre Road	
Survey Method	**AnaBat**	**Manual**	**AnaBat**	**Manual**	**AnaBat**	**Manual**	**Manual**	**Manual**	**AnaBat**	**Manual**	**AnaBat**	**Manual**
Date of survey	10/07/07	21/05/07	10/07/07	21/05/07	22/05/07	27/06/2007	01/08/06	21/05/07	25/07/07	No survey undertaken	23/05/07	25/06/07
Sunset/sunrise	22:02/04:25	21:34/04:35	22:02/04:25	21:34/04:35	21:37/04:32	22:11/04:11	21:33/05:04	21:35/04:34	21:38/04:50		21:39/04:30	22:12/04:10
First Bat	22:53	21:45	22:32	21:35	22:07	21:30	01:48	21:55	22:20		22:20	No bats recorded
Last Bat	03:39	23:00	03:42	22:30	03:42	23:30	03:37	22:23	04:10		03:33	
Total species	2	2	2	2	3+	1+	2	2	2		3+	
Total passes	29	8+	52	22	58	5	91	32	109		202	
Total Soprano Pipistrelles	8	6+	11	15	43	0	25	15	37		86	
Total Common Pipistrelles	18	2+	38	17	8	4	66	17	58		98	
Total Myotis Species	0	0	0	0	3	0	0	0	0		1	
Total Any Pipistrelle Species	3	0	3	0	1	1	0	0	14		16	
Total Unknown species	0	0	0	0	3	0	0	0	0		1	
Summary of information gathered at site	Megray Burn supports a small population of commuting pipistrelles and is a foraging area for common and soprano pipistrelles. Bats observed commuting north-south along the burn between roosts and foraging sites in H-ram and Megray Woods shortly after sunset suggesting that bats are roosting nearby. Data collected from Anabat surveys confirm this information recording two species of pipistrelle bats (common and soprano).		Both common and soprano pipistrelle activity was recorded, although most activity recorded along Megray Burn. Data collected from the AnaBat supports the information collected from the manual transect as per Megray Burn.		Several common pipistrelle bats observed commuting along the burn shortly after sunset from west – east, possibly indicating a small roost in Megray Wood. One bat observed flying north-south over the valley. Sheltered habitat and wetland/scrub support foraging. Data collected from the AnaBat detectors supports the manual transect data with both common and soprano pipistrelle activity recorded and a single Myotis bat (presumed Daubenton's bat) recorded.		The road through Megray Wood provides an open edge feature along which common and soprano pipistrelle bats were observed foraging during manual surveys. No commuting behaviour observed but bats appeared 25 minutes after sunset so it is likely that a roost may be close by, and the road represents a frequently used foraging route.		No manual transect was carried out at this location due to health and safety issues accessing the site after dark. The AnaBat data collected shows soprano and common pipistrelles are present in this area. The wet habitats and scrub provide good foraging habitat.		No bats recorded during manual surveys, likely to be due to inclement weather on the survey night. Analysis of the AnaBat data showed large numbers of bat passes of which the majority were pipistrelles with a single Myotis bat (presumed Daubenton's bat due to the presence of wet habitats). The road is likely to provide a commuting route between foraging habitats at Fishermyre Moss and the Burn of Muchalls.	

Section FL2

3.2.17 This Section is characterised by large areas of open farmland with limited foraging value to bats – with a network of field boundaries composed of stone dykes and drains which have some commuting potential. Gorse and tree lined tracks and roads also provide potential commuting routes throughout. A large area of open heath in the southwest of the Section at Fishermyre has limited foraging value due to its exposure. However, the edge habitats provide very good foraging and commuting habitats in the form of mixed scrub, mixed woodland and willow scrub as per Section FL1 above. The most concentrated area of bat activity was around the Burn of Muchalls and associated riparian habitat which runs across the width of the corridor, connecting habitats and potential roosts sites on either side of the study area.

3.2.18 Nine buildings were identified as roosts during daytime and evening surveys: Burnside was also found to be used in the autumn by soprano pipistrelles; Elrick and a house in Cookney were all confirmed as roosts during evening surveys; evidence of bats was recorded at four additional buildings in Cookney as well as at Hillside and a building near Burnside. A further 12 buildings were identified as potential roosts (category 2a) during day surveys and two as category 2b. One culvert was identified as having high roost potential with another culvert identified as a roost just outside the study area over a drain which runs through one of the Habitat Areas. Four sites with potential tree roosts were recorded including several trees along the Burn of Muchalls. In addition a culvert was identified as supporting a bat roost on the Burn of Blackbutts.

3.2.19 A total of at least 204 bat passes were recorded during the 2006 activity surveys. Of these passes, 135 were foraging bat passes, 15 were commuting bat passes and 25 were foraging/commuting passes from common and soprano pipistrelle. At least 16 Daubenton's bat foraging passes were recorded with a further 18 foraging passes attributed to a combination of common pipistrelle and Daubenton's bats. Commuting routes were identified along the edge of the woodland habitat beside the B979, along the length of the Burn of Muchalls, between Elrick and the Burn of Muchalls, along the drain to the north of Clayfolds and along the access track running south from Cookney. Foraging areas were identified along the road between Fishermyre and the Burn of Muchalls (particularly in association with buildings and their garden) along the length of the Burn of Muchalls, along the track between Elrick and the Burn of Muchalls and along the access track running south from Cookney (also often in association with buildings and garden planting).

3.2.20 Three potential commuting routes were identified during daytime surveys in 2006 along the Burn of Muchalls, the road between the burn and Cookney, and the road through Cookney.

3.2.21 High numbers of bat passes were recorded during the 2007 manual transect surveys. Of these passes, foraging and commuting bat passes were recorded from common and soprano pipistrelles. Static AnaBat SD1 bat detectors recorded 194 passes from species including soprano (23 passes) and common (171 passes) pipistrelles between the three commuting routes. Only the roads in Cookney were confirmed as supporting commuting routes and while the road between Cookney and the Burn of Muchalls may support a commuting route for the bats roosting at the farm, alternative routes to foraging areas are likely to exist. The Burn of Muchalls is a relatively cluttered feature and although no commuting behaviour was recorded along the burn it is likely that bats may commute above the level of the trees.

3.2.22 The results from Section FL2 are shown in Table 10, Table 11 and Table 12 and Figures 40.4b-d and 40.5b-d.

Table 10 – Specific Features Within Section FL2

Habitat Area	Feature	Feature Type	Description / Additional information
F12	Fishermyre Wood. Wet habitats to the south of Allochie Croft	Foraging and commuting	The area is dominated by heath around the edges of the Habitat Area, providing medium potential foraging habitat, but with moderate exposure levels. Scrub borders the northwest and southeast edges and mixed semi-natural woodland is present towards the southwest. There are also scattered pockets of willow-dominated wet woodland ranging across the south which provide sheltered high value foraging and commuting habitats. Soprano pipistrelles were identified foraging along the gorse lined road to the south of the Habitat Area and pipistrelle spp. were recorded foraging and commuting along the same southern edge as per F10 in Section FL1. Pipistrelles were recorded commuting along the road between Fishermyre and the Burn of Muchalls (U88K) during the 2006 survey period. Common pipistrelle were recorded on the B979 commuting along the tree line of the mixed woodland. This provides connectivity with the Habitat Areas further south as per F6, F5 and F2.
F13	Agricultural fields surrounding Hill of Muchalls	One roost, foraging and commuting, potential roosts	This area is comprised of agricultural land that is predominantly improved grassland or grasses cropped for silage and of low value to foraging and commuting bats. However small areas of mature mixed plantation woodland and shelter belts throughout and occasional patches of dense gorse scrub provide medium potential for commuting and foraging. Foraging common and soprano pipistrelle were recorded around the properties and gardens of Broomhill cottage, Strathgyle Cottage and Hillside/ Woodview. Commuting pipistrelle sp. were recorded along a dyke lined track between the cottages at Woodview and the Back Burn. Trees in the garden of Broomhill cottage was identified as a potential tree roost (category 2a). A culvert/bridge over Back Burn has high roosting potential due to its location along a watercourse and a number of suitable gaps and cracks. The burn flows north into the Burn of Muchalls (F15) which is a valuable roosting, commuting and foraging resource. Four buildings were identified as category 2a potential roosts (Broomhill Cottage, Broomhill Farm, Hillside and Elrick Cottar House) although emergence surveys did not confirm the presence of bats; and two buildings were identified as category 2b potential roosts (Howieshill and Strathgyle Cottage. One historic roost was identified at Woodview during a day survey but no bats were observed during the emergence survey.
F14	Heath by Allochie	Potential foraging and commuting	A small area of heathland that has not yet been grubbed up for agriculture provides foraging potential of medium value with medium potential commuting along the track on the southern edge.
F15	Burn of Muchalls	Two roosts, foraging, commuting and potential tree roosts	Varied riparian habitat surrounding the Burn of Muchalls includes semi-natural wet woodland in the eastern section with young mixed plantation woodland in the western. Within the western area there are also two ponds surrounded by trees providing ideal sheltered foraging habitat. Foraging and commuting Daubenton's bats, and common and soprano pipistrelle were recorded along the length of this habitat in 2006 and 2007 surveys: over the burn, within the woodlands and over the ponds. The burn provides a linear feature connecting habitats on either side of the corridor with invertebrate prey as well as insects associated with the woodland habitats. Several trees within this area provide medium to high potential for roosting. A soprano pipistrelle roost was identified in the farmhouse at Burnside which was also shown to be used in the autumn; and an outbuilding at Burnorrachie Croft has been used as a roost for approximately ten years although the owners had not seen the bats at the time of survey in 2006. During the day survey evidence indicated recent use (category 1b).

Habitat Area	Feature	Feature Type	Description / Additional information
F16	Agricultural fields from north of the Burn of Muchalls to Cookney	Six building roosts, one roost in culvert, foraging, commuting, potential building and tree roosts	This Habitat Area is predominantly agricultural land with low potential to foraging and commuting bats. The management of the area has however been sympathetic and there are many newly planted hedgerows and shelterbelts and groups of mature trees including Scots pine and beech. which have the potential to provide foraging areas and commuting routes on maturity. Field boundaries are predominantly stone dykes which provide linear features with some potential to commuting bats. Common pipistrelle were recorded foraging and commuting along the Burn of Blackbutts and an area of willow scrub/ bog adjoining this has high foraging potential. Daubenton's bat droppings under a crack in the stonework indicated the presence of a small roost in a culvert over the Burn of Blackbutts just outside the study area. Foraging and commuting common and soprano pipistrelle were also recorded on the track between Elrick and the Burn of Muchalls and foraging common pipistrelles were recorded on the tree lined track to the south of Cookney as far as Cairnlea and the track leading south from here, along the western edge of the habitat area was identified as a foraging and commuting route used by common pipistrelles. Trees within the garden at Elrick were identified as having high roosting potential (category 2a) and foraging pipistrelles were recorded in this area. A mature pollarded tree behind the war memorial in Cookney has a large split in it providing a potential bat roost (category 2a). Cookney Grange (2 bats) and one of the barns at Elrick were identified as roosts for soprano pipistrelle, with both common and soprano pipistrelle recorded foraging in the grounds along the tree/ hedge line. Elrick may also be a brown long-eared bat roost. Buildings identified as roosts during day surveys, with evidence of recent use (category 1b) include one of the farmhouses at Cookney Mains, a bungalow in Cookney, Kirkton and Cairnlea (although no bats were observed emerging during emergence surveys). The roost at the bungalow may be a maternity roost due to the presence of large quantities of droppings and according to landowner consultation. Potential roosts in this area include Elrick farmhouse, Clayfolds, the newly built house to the south of Clayfolds (which has entry holes specially incorporated in the eaves for bats), Burnorrachie, Kirkhill Cottage, Floors, Bents Cottage and North Cookney (all category 2a). North Cookney Farm was surveyed in the evening but no bats were observed emerging. Pipistrelle bats were recorded commuting along the road through Cookney which represents a sheltered connection between roosts in Cookney village and foraging opportunities north of Harecraig as per F17/F18. This is likely to be a frequently-used route, given the paucity of alternative linear features in the area.

Table 11 – Bat Activity Results for Section FL2

Grid Reference	Habitat	Species	Number of Bat Passes	Activity2	Notes
NO 872 913	Hillside	Common Pipistrelle	10	F	Foraging around garden with trees, stopped after 1.5 mins.
NO 875 918	Burn of Muchalls	Common Pipistrelle	7	F	Circling around mature trees on driveway and corner of road at bridge. Up and down burn.
NO 872 910	Broomhill Cottage	Common Pipistrelle	1	F	In garden from corner of cottage to tree and back behind cottage.
NO 869 906	Gorse scrub	Unknown	1	F	Above gorse scrub at ~3m.
NO 871 920	Tree lined track	Common Pipistrelle	5	C/F	Two bats commuting, three bats foraging.
NO 871 919	Tree lined track	Common Pipistrelle	2	F	Along track from direction of house.
NO 869 920	Track	Common Pipistrelle	1	C	Flying southeast along track.
NO 872 919	Burn of Muchalls	Soprano Pipistrelle ?	1	C	Picked up on bat detector but not seen.
NO 873 919	Burn of Muchalls	Common Pipistrelle	6	F/C	Three foraging west, one localised foraging, one commuting to east and one commuting to west.
NO 874 918	Burn of Muchalls	Common Pipistrelle	1	F	Flying southwest along burn.
NO 875 917	Burn of Muchalls	Common Pipistrelle	1	C	Flying west.
NO 875 922	Field Boundary	Common Pipistrelle	3	F	Flying southwest.
NO 878 925	Field Boundary	Common Pipistrelle	1	C	Along field boundary.
NO 876 926	Field Boundary	Common Pipistrelle	5	F	Flying northwest along field boundary.
NO 872 921	Elrick	Soprano Pipistrelle	3	C	Flying south.
NO 870 919	Pond	Daubenton's	15	F	Over pond.
NO 869 920	Pond	Common Pipistrelle	1	F	Alongside pond.
NO 868 921	Pond	Common Pipistrelle	5	F	Beside pond localised foraging.
NO 872 919	Burn of Muchalls	Common Pipistrelle	1	C	east along field boundary

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

Grid Reference	Habitat	Species	Number of Bat Passes	Activity2	Notes
NO 872 919	Pond	Daubenton's	1	F?	Just after rain stopped
NO 871 919	Tree line	Common Pipistrelle	14	F/C	Seven foraging, seven commuting east along tree line and burn at 2-3m
NO 870 919	Pond	Common Pipistrelle + Daubenton's	18	F	Along pond length 0.5-2.5m
NO 869 920	Pond	Common Pipistrelle	8	F	End of pond/trees.
NO 868 920	Track	Soprano Pipistrelle	5	C	Following track.
NO 870 919	Pond	Soprano + Common Pipistrelle	16	F	Along vegetation at edge of pond ~2m, probably just one pip.
NO 870 919	Pond	Common Pipistrelle	28	F	Along vegetation at edge of pond ~2m.
NO 872 919	Burn of Muchalls	Common Pipistrelle	2	C	Flying east to west.
NO 870 932	Track	Common Pipistrelle	6	F	Following track south, southwest to north, northeast.
NO 870 931	Track	Common Pipistrelle	24	F	Up + down track between row of trees (on either side).
NO 869 930	Track	Common Pipistrelle	10	F	Along track and in garden ~3m.
NO 870 932	Track	Common Pipistrelle	7	F	Following track.

Table 12 – Results of 2007 Commuting Route Surveys, Section FL2

Transect Area Name	Road past Elrick		Burn of Muchalls		Road through Cookney	
Survey Method	AnaBat	Manual	AnaBat	Manual	AnaBat	Manual
Date of survey	23/05/07	25/06/07	25/07/07	24/05/07	25/07/07	18/06/07
Sunset/sunrise	21:39/04.30	22:12/04:10	21:38/04:50	21:41/04:29	21:38/04:50	22:11/04:08
First Bat	22:34	No bats recorded	21:58	22:03	22:10	21:45
Last Bat	03:11		04:34	23:15	04:00	23:25
Total species	2		2	2	2	1
Total passes	20		140	Many	34	14+
Total Soprano Pipistrelles	3		16	Many	4	0
Total Common Pipistrelles	17		124	Many	30	14+
Total Myotis Species	0		0	0	0	0
Total Any Pipistrelle Species	0		0	0	0	0
Total Unknown species	0		0	0	0	0
Summary of information gathered at site	AnaBat data collected show soprano and common pipistrelle bats are present in this area. The road may act as a commuting route for bats roosting at Elrick although there is little shelter and alternative commuting routes exist from the farm.		Burn and riparian habitats support many foraging soprano and common pipistrelle bats; road and driveways provide sheltered open flyways. The burn itself is quite cluttered but bats observed flying at treetop height as well as foraging lower down. Road may be used as a commuting route by bats roosting at Elrick; commuting bats observed during 2006 surveys.		All the roads near the junction to the north of Cookney are used extensively by foraging bats common pipistrelles and a small number of soprano pipistrelles and commuting behaviour between foraging sites was observed. The use of the shelterbelts is not surprising given the proximity to roosts in Cookney and at North Cookney Croft.	

Section FL3

3.2.23 This section is characterised by large areas of open farmland with limited foraging value to bats and high levels of exposure, with a network of field boundaries composed of stone dykes, gorse scrub and drains which provide some commuting potential. Gorse and tree lined tracks and roads also provide potential commuting routes throughout. Areas of scattered gorse and willow scrub, coniferous plantation and heath provide medium to high foraging potential and commuting potential along their edges.

3.2.24 The buildings, gardens and hedge-lined road at Cookney are of high value to foraging bats, as per Section FL2; especially as the buildings and trees provide shelter on an otherwise exposed hill. Crynoch Burn and associated riparian habitat in the northwest also represent a high value foraging area and an ideal corridor connecting habitats and potential roost sites upstream, downstream and beyond the boundary of the study area, including Kingcausie and the River Dee. Foraging and commuting bats (predominantly soprano pipistrelles) were recorded along the majority of its length. Foraging and commuting activity was also recorded along several tree and scrub lined tracks throughout the section, often associated with identified and potential building roosts, e.g. along the track running north from North Cookney Croft to West Stoneyhill and West Town of Stoneyhill, beside North Rothnick and along the tree lined road to the south of Burnhead where a Natterer's bat was also recorded. High levels of foraging activity and swarming during autumn surveys recorded at North Rothnick may indicate the presence of a roost at the farm. This site has been identified as having roost potential (category 2a), but requires an evening emergence survey. Similarly, high levels of foraging activity around Burnhead may indicate the presence of one or more roosts either at Burnhead or nearby. The presence of mature trees and gardens associated with the houses and the number of linear features connecting with the surrounding area also increases the value of this semi-urban habitat. Crossley Pond is sheltered by trees and provides high value foraging on the edge of the survey corridor where small numbers of Daubenton's bats were recorded. Additional foraging activity was also recorded during emergence surveys around the houses and gardens at Cookney, North Cookney Croft, Crossley and Altries Manse.

3.2.25 Seven buildings were identified as roosts during daytime and evening surveys and through personal communication including at West Stoneyhill, a cottage at Crossley, farm building at Greens of Crynoch, with five of these confirmed by emergence surveys: two in Cookney, one at North Cookney Croft, Crossley Steading and Altries Manse. A further 18 buildings were identified as potential roosts during day surveys (10 category 2a and 8 category 2b), with no emerging bats recorded at four buildings which were surveyed in the evening. Two culverts were identified as having medium roost potential.

3.2.26 A total of 202+ bat passes were recorded during the manual surveys in 2006. Of these passes, 178+ were foraging bat passes (including three also making social calls), seven were commuting bat passes and four were commuting/foraging passes attributed to common and soprano pipistrelle. One foraging pass was recorded for Daubenton's bat at Crossley Quarry Pond and nine Natterer's bat foraging passes were recorded in the far north of the study area. Foraging areas were identified along the tree lined road between Burnhead and Craigentath, along the tree lined track running east from West Stoneyhill, around the houses and vegetation at Burnhead, North Rothnick, Crossley and Altries Manse, along Crynoch Burn and over the water-filled quarry to the west of Crossley.

3.2.27 Five potential commuting routes were surveyed in 2007 by manual and remote detector surveys: through Cookney village as per section FL2, along the burn network at Rothnick, the road to the north of North Rothnick and the road past Greens of Crynoch and Altries Manse. An additional potential commuting route was identified along a track between West Stoneyhill and Newhall although this could not be surveyed due to access restrictions as per section 2.6 above. A total of 74+ bat passes were recorded during the manual surveys for 2007. Of these passes, 35+ were foraging bat passes (including 12 social calls), 27 commuting calls from common and soprano pipistrelle were recorded. Remote detector surveys performed in 2007 using AnaBat SD1 bat detectors recorded little bat activity. At Balnagubs one pipistrelle species pass was recorded within an evening. At the Burn of Elsick two passes were recorded from soprano and a common

pipistrelle bat. At Rothnick one soprano pipistrelle was recorded. Greens of Crynoch was more heavily used with 33 bat passes recorded including 32 common pipistrelle bats.

3.2.28 The results from Section FL3 are shown in Table 13, Table 14 and Table 15 and Figures 40.4d-f and 40.5d-f.

Table 13 – Specific Features Within Section FL3

Habitat Area	Feature	Feature Type	Description / Additional information
F17	Wet habitats north of Cookney	Two roosts, foraging, commuting and potential roosts	This Habitat Area consists of part of the village of Cookney, coniferous and broadleaved shelterbelts, rough grazing with scattered scrub and an area with patches of bog, wet and dry heath. The area of grazing and scrub to the north of Cookney is bounded by a line of broadleaved trees and a stone dyke. Foraging and commuting common and soprano pipistrelles were recorded along the length of this treeline during surveys in 2006 and 2007. The area of rough grazing and scrub has medium-high potential for foraging due to its sheltered nature. However, the area of heath has lower potential foraging and commuting value due to higher exposure levels. Common pipistrelle roosts were identified in one of the barns at Mains of Cookney (4 – 5 bats recorded emerging from the roost)in early July 2006) and at Hillend in Cookney. Two potential roosts (category 2a) were also identified at R.U.M House (the original church) and a newer barn beside R.U.M House. These potential roosts were surveyed in the evening but no bats were observed emerging. Foraging common and soprano pipistrelle were recorded around all of the buildings, along the road and hedge lines during the emergence and commuting route surveys. This Habitat Area is closely linked to the bat roosts in F16 where alternative bat roosts were identified.
F18	Agricultural fields from Cookney to East Rothnick Wood	One roost, foraging, commuting, potential building and culvert roosts	Large area of predominantly improved grassland, occasional arable fields and scarce marshy grassland provide limited foraging or commuting potential for bats due to low insect abundance and high exposure levels. Field boundaries composed of stone dykes, scrub and drainage channels (including a network of burns) provide some linear features of medium commuting potential through this otherwise low value and exposed habitat. Scrub and tree lined tracks towards the southern end of the habitat area provide good foraging and commuting with common pipistrelle recorded in several places along the track between North Cookney Croft , West Stoneyhill and the road adjacent to West Town of Newhall. The line of mature beech trees along the track at West Town of Newhall has good potential for tree roosts (category 2a) and a commuting common pipistrelle was recorded on this stretch of the track. Pockets of scrub throughout the area provide some foraging and commuting potential, but only where connected with other habitats of greater potential for foraging, commuting or roosting. Soprano pipistrelle were recorded foraging and commuting along the gorse lined track beside North Rothnick Farm. The owner of South Rothnick farm reports that there is bat activity around the property in the evenings. A culvert with medium roosting potential was identified beneath the track to the north of South Rothnick. One common pipistrelle roost was identified at North Cookney croft with 15 – 20 bats observed emerging from the front of the house in July 2006, which means the roost is probably a maternity roost. The landowner reported bats roosting at West Stoneyhill (pers. Comm. Mr. Lawson) although this was not surveyed during the evening due to problems with access as per section 2.6. Potential roost sites (category 2a) were identified at Stoneyhill House, South Rothnick, North Rothnick and East Rothnick due to the presence of gaps in masonry and under tiles in the buildings. Of these only Stoneyhill House was surveyed in the evening but no bats were observed emerging although constant common pipistrelle foraging activity was recorded along the tree lined path during the survey. Commuting route surveys undertaken in 2007 along the burn network and the tracks and road at Rothnick revealed very low levels of bat activity, possibly due to high exposure

Habitat Area	Feature	Feature Type	Description / Additional information
			levels; although autumn surveys at North Rothnick showed many pipistrelle bats swarming and social calling around the barns which indicates that the features may be used later in the year.
F19	Stoneyhill	Potential foraging and commuting	Willow and gorse scrub to the north of Harecraig provides high foraging and commuting potential. Smaller areas of rough pasture are of low potential to foraging and commuting bats. The road through Cookney and past Harecraig was identified as a commuting route for pipistrelle bats in the 2007 surveys as per F17 and F18. None of the buildings or trees in this section were found to have any roost potential.
F20	Agricultural Fields around Berrytop	Foraging, potential commuting	Only part of this Habitat Area is within the study area . It consists of a series of agricultural fields with occasional pockets of scattered scrub, notably within the vicinity of both new and established dwelling houses. The area is open and exposed with generally low foraging and commuting potential with the exception of the road which forms the northern boundary to the Habitat Area as per F21. Foraging soprano pipistrelle and Daubenton's bats were recorded over Crossley Pond, just outside the corridor to the west. These bats are likely to commute along the scrub lined road to roost sites within this or adjacent Habitat Areas, e.g. F21. No potential roosts were identified in this area and activity surveys along the road did not reveal any bats.
F21	Wet habitats around East Crossley	Two roosts, foraging, commuting and potential roost	The habitats in this area range from soft, rush-dominated, sheep-grazed fields in the north to richer dry heath/acid grassland mosaic with scattered scrub. The potential foraging value of this area is medium due to a lack of shelter and linear features, with low commuting potential. There are mature trees in the gardens around the three houses at Crossley and common and soprano pipistrelle were observed foraging in this area during emergence surveys. Crossley Pond is likely to provide a foraging resource for bats roosting in this Habitat Area as per F20, and commuting soprano pipistrelles were recorded along the road on the edge of the habitat area in the north near the pond. Crossley Farm Steading is an identified common pipistrelle roost with at least 3 bats observed emerging. Crossley is also a roost identified during day surveys due to the presence of a small number of droppings on an outside wall, although no bats were observed emerging during the evening survey (1b). Neither roost is considered to support maternity colonies of bats. Roost potential was recognised at East Crossley and Rothnick Croft (category 2a) although these were not subject to an emergence survey due to the distances involved.
F22	Agricultural fields from Quoscies to Stranog	One roost, foraging and potential commuting	A series of improved fields with soft rush are prominent in the mid-section and scattered and dense gorse scrub is found throughout the north. The foraging and commuting potential for the northern area is medium with lower potential in the open, grazed southern section. Commuting bats could potentially be using the scrub habitat in conjunction with or to connect with the quarry pond to the west of F20 where foraging Daubenton's and soprano pipistrelle were recorded, although activity surveys did not confirm potential commuting or foraging activity. One common pipistrelle roost was identified at Altries Manse on the northern edge of the Habitat Area (single bat observed emerging on the night of survey in mid-June 2006 and landowner comments that bats often fly in the garden). Foraging activity was recorded within the garden around the mature trees during the emergence survey.

Habitat Area	Feature	Feature Type	Description / Additional information
F23	Dry heath/acid Grassland mosaic to the west of Wedderhill	Potential foraging and commuting	Dry heath/acid grassland mosaic with scattered scrub and patches of wet heath leading onto bog provides medium foraging and commuting potential around the edges. The lack of shelter in the middle of this exposed area, in addition to limited linear features of note for commuting, reduces its potential value although the area extends the overall provision of foraging habitat at F24.
F24	Bog/heath to the immediate west of Wedderhill	Potential foraging and commuting	Wet bog and dry heath, wet birch woods and scattered broadleaved trees and mature Scots pine dominate this area. A small vegetated burn is present with a pool of standing water. The area provides high potential foraging and medium potential commuting habitat along the woodland edges and roadside. There are no trees or buildings with roost potential within the area and no surveys were undertaken in the area due to the distances from the proposed scheme.
F25	Plantation Woodland south of Stranog	Potential commuting and foraging as per F26	Very young coniferous plantation woodland providing low value to foraging bats and medium potential to commuting bats around the edges including along the road as per F26. Bats leaving the roost at Altries Manse (F22) may also commute along this edge toward Craigentath Wood as per F26.
F26	Agricultural fields to the south of Polston Farm	One roost, foraging, commuting and potential roosts	Dominated by improved fields, and rare scrub patches, but marshy grassland is present to the west of Burnhead. Gorse-lined field boundaries and coniferous shelterbelts in the southern section beside Greens of Crynoch provide good potential commuting routes between roosts and habitat areas to the south and Crynoch Burn in F27. Craigentath Wood lies just outside the Habitat Area and is composed of open, mature oak woodland with high foraging, roosting and commuting potential. The road past Greens of Crynoch represents a commuting route for pipistrelle bats commuting from the wood, as confirmed by manual and static detector surveys in 2007.A stone culvert at Craigentath Burn under the road in the southern part of the Habitat Area is of medium roosting potential. One roost was identified by the presence of droppings during days surveys but not confirmed with an emergence survey (category 1b) in one of the old barns at Greens of Crynoch. Potential roosts (category 2b) were recorded at,Craigentath and Blaikiewell Farmhouse.
F27	Floodplain and Immediate surrounds of Crynoch Burn (south)	Foraging, commuting	Semi-improved grassland dominates the south of this Habitat Area, giving way to improved fields with abundant gorse scrub. Crynoch Burn and associated riparian habitat provides ideal foraging and commuting habitat of high value, connecting foraging and roosting habitats to the north (including Kingcausie and the River Dee) and south. Common and soprano pipistrelle and Natterer's bat activity was recorded along the northern end of this Habitat Area during 2006 activity surveys, showing the value of the woodland areas to the north of the habitat area. Activity surveys were not carried out in the southern part of the Habitat Area due to the presence of horses and livestock however, the burn is likely to be used by a number of bats as per Part 1 of this report , Habitat Areas S19 and S22.

Table 14 – Bat Activity Results for Section FL3

Grid Reference	Habitat	Species	Number of Bat Passes	Activity3	Notes
NO 871 933	Road	Common Pipistrelle	25	F	Along road between trees.
NO 873 934	Tree-lined road	Soprano Pipistrelle	5	F	Following tree lined road.
NO 871 936	Road with scrub	Common Pipistrelle	2	F	Following south to north along road, in scrub on sides.
NO 871 939	Road	Common Pipistrelle	3	F	Following road.
NO 869 942	Track	Common Pipistrelle	3	F	East to west following track.
NO 873 942	Garden and track	Common Pipistrelle	3	F	Around garden and track.
NO 866 963	Pond	Daubenton's	1	F	Around pond.
NO 866 963	Pond	Soprano Pipistrelle	3	F	Along road near trees / near trees by pond.
NO 870 956	Tree line, Rothnick croft	Common Pipistrelle	2	C+F	Foraging along road by Rothnick croft, commuting from east to west in tree-line
NO 873 954	Track, N. Rothnick barn	Soprano Pipistrelle	1	C	Near North Rothnick barn ~ 3m along access track toward main road.
NO 872 954	N. Rothnick barn	Soprano Pipistrelle	30+	F	North Rothnick barn, continuous foraging around barn entrance.
NO 872 954	Road, N. Rothnick barn	Common Pipistrelle	30+	F	Continuous foraging beside North Rothnick barn, next to road.
NO 874 955	Track	Soprano Pipistrelle	30+	F	Continuous foraging along access track, flying at 2-3m.
NO 870 956	Track	Soprano Pipistrelle	3	F	Along track.
NO 870 962	Road	Soprano Pipistrelle	1	C	Along road south to north at ~ 2m.
NO 868 963	Road	Soprano Pipistrelle	1	C	North to south across road.

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

Grid Reference	Habitat	Species	Number of Bat Passes	Activity3	Notes
NO 872 954	N. Rothnick barn	Soprano Pipistrelle	3	SC+F	In circles around front of barn.
NO 874 985	Edge of field	Natterer's	9	F	Two Natterer's circling around trees and edge of field by road 2m.
NO 863 985	Crynoch Burn	Soprano Pipistrelle	7	F	Foraging along burn.
NO 864 984	Crynoch Burn	Soprano Pipistrelle / Common Pipistrelle	9	F	Following burn. Seven soprano and two common.
NO 865 985	Crynoch Burn	Common Pipistrelle	3	C	Flying west along burn.
NO 865 984	Crynoch Burn	Soprano Pipistrelle / Common Pipistrelle	2	F/C	Flying southwest along burn.
NO 864 983	Crynoch Burn	Soprano Pipistrelle	13	F	flying southwest along burn.
NO 874 984	Crynoch Burn	Soprano Pipistrelle	1	F	Over burn.
NO 875 980	Crynoch Burn	Soprano Pipistrelle	2	F	Flying at ~ 6m circling, and second bat round corner.
NO 875 981	Crynoch Burn	Common Pipistrelle	1	F	Flying north at ~ 6m.
NO 874 984	Crynoch Burn	Common Pipistrelle	4	F	Over burn.
NO 873 984	Crynoch Burn	Common Pipistrelle	4	F	Over burn.

Table 15 – 2007 Commuting Route Results Section FL3

Transect area name	**East Rothnick (Balnagubs Burn)**		**East Rothnick (Burn of Elsick)**		**Rothnick**		**North Rothnick**		**Between Stranog Crossroads and Craigtath Farm (Greens of Crynoch)**	
Survey method	**AnaBat**	**Manual**	**AnaBat**	**Manual**	**AnaBat**	**Manual**	**AnaBat**	**Manual**	**AnaBat**	**Manual**
Date of survey	10/07/07	26/06/07	10/07/07	26/06/07	10/07/07	27/06/07	25/07/07	24/05/07	24/05/07	20/06/07
Sunset/sunrise	22:02/04:25	22:12/04:10	22:02/04:25	22:12/04:10	22:02/04:25	22:11/04:11	21:38/04:50	21:41/04:29	21:41/04:29	22:11/04:08
First Bat	23:01	No bats recorded.	23:01	23.05	23:34	No bats recorded	22:53	No bats recorded	22:58	22:32
Last Bat	23:01		23:01	23.05	23:34		03:41		02:18	23:16
Total species	1		2	1	1		2		1+	2
Total passes	1		2	1	1		39		33	14+
Total soprano pipistrelles	0		1	0	1		8		0	1+
Total common pipistrelles	0		1	0	0		24		32	12+
Total Myotis species	1		0	0	0		0		0	0
Total any pipistrelle species	0		0	1	0		7		1	1
Total unknown species	0		0	0	0		0		0	0
Summary of information gathered at site	No bats recorded during manual surveys despite good weather. AnaBat data collected shows little bat activity with only one Myotis species (likely to be Daubenton's bat due to the presence of water) recorded. Burn provides some foraging opportunities but is relatively exposed.		Single pipistrelle bat recorded during manual surveys commuting S-N straight across fields, not using features. AnaBat data collected shows little bat activity with only 2 passes from a soprano and a common pipistrelle. Area likely to be an occasional foraging area for a small number of bats.		No bats recorded during manual surveys despite good weather. AnaBat data collected shows little bat activity with one soprano pipistrelle bat pass. Track is lined with scrub but otherwise exposed and with few sheltered foraging opportunities nearby.		No bats recorded during manual surveys, possibly due to damp weather and exposed nature of site. AnaBat detectors recorded common and soprano pipistrelle bats flying along the road over an hour after sunset, possibly commuting between foraging areas.		Pipistrelle bats observed commuting from east – west (from Craigentath Wood toward Crynoch Burn) along the road and foraging continuously in trees along roadside in heights ranging from 1m -6m. Data collected from the AnaBat supports the manual transect data with the majority of bat passes being soprano pipistrelles with fewer common pipistrelles.	

3.3 Survey Results Summary

3.3.1 A number of features of value to bats have been identified within the study area between Stonehaven and Cleanhill. The study area is characterised by large areas of open arable and pastoral farmland with roosting and foraging opportunities restricted to small groups of buildings and trees. Smaller fragments of roosting, foraging and commuting habitat including burns, shelterbelts, woodlands, walls and buildings are interspersed within the study area.

3.3.2 The main areas of woodland within the study area are found at the southern Stonehaven end at Megray Wood and Fishermyre Wood. The B979 along the western edge of the study area is lined by a broadleaved shelterbelt and portions of woodland, the rest of which lie outwith the corridor. Riparian woodland exists at Megray Wood/ Limpet Burn and the Burn of Muchalls. The only larger area of coniferous plantation is to the south of Greens of Crynoch, which is still very immature.

3.3.3 Three main areas of open water and flowing water exist at Megray Wood/ Limpet Burn, the Burn of Muchalls and some of Crynoch Burn (which flows through the north of the study area and connects the Fastlink with the Southern Leg). Other smaller burns and field drains are found throughout the study area.

3.3.4 Nineteen bat roosts were identified during the 2006 and 2007 buildings surveys which were within the 1km survey area. Nine of these were confirmed as roosts during evening surveys; ten were not confirmed as being in use at the time of surveys but signs of bats or landowner consultation revealed that bats use the buildings at certain times of the year

3.3.5 Twenty eight buildings/properties were identified during the 2006/2007 surveys with potential to be used as roosts (category 2a) of which ten have had emergence surveys carried out, but no bats were observed emerging. Of the other potential roosts, nine are category 2b roosts.

3.3.6 One culvert was identified as having a small Daubenton's bat roost, one culvert was identified as having high potential for roosting, four culverts have been identified as having medium potential for roosting, and six sites have been identified as having trees with roost potential.

3.3.7 Despite a thorough assessment of trees, including a close examination of potential roost holes where these were accessible, few potential tree roosts were identified in proportion to the number of trees surveyed as most trees are of young plantation origin and therefore of inherently low roost potential.

3.3.8 Four of the seven bat species known to be present in Aberdeenshire were observed during field surveys, exhibiting a range of behaviour including foraging, commuting, social calling and emerging from or returning to roosts. Bat activity was observed along the entire study area, with increased activity in certain predictable areas. Many landscape features such as tree-lined pathways and roads were used by common and soprano pipistrelle bats. Daubenton's bat activity was observed around water features and wet woodland areas and brown long eared bats were observed at Elrick, potentially using one of the barns as a roost.

3.3.9 In total, at least 615 bat passes were recorded across the study area during the 2006 manual transect surveys. Of these passes, at least 471 were foraging bat passes, 50 were commuting and 52 were foraging/commuting bat passes from pipistrelle species; at least 17 Daubenton's bat foraging passes and nine Natterer's bat foraging passes were recorded. Section FL2 contained the greatest concentration of bat activity and the least was in Section FL3. Areas of activity were concentrated around woodland, watercourses/ features and the village of Cookney. Features of concentrated bat activity include Megray Wood (17 passes), Limpet Burn (100+ passes) the shelterbelt adjacent to the B979 (27 passes), around Fishermyre (62 passes plus activity recorded during emergence surveys), along the Burn of Muchalls and fish ponds (100+ passes) and Cookney (100+ passes). Small numbers of bats were observed foraging, commuting and displaying social activity in predictable areas away from these main areas.

3.3.10 A total of at least 110 bat passes was recorded across the study area during the 2007 manual transect surveys. Of these passes, at least 50 were foraging bat passes, 35 were commuting and

including at least seven social calls and two unknown calls from pipistrelle species. Section FL3 showed the greatest concentration of bat activity and the least was in Section FL2. Features of concentrated activity include farm access around Megray (22 passes), Cookney Road (14+ passes) and the road to the west of Craigentath Wood (14+ passes).

3.3.11 An additional survey was performed in 2007 using AnaBat SD1 CF Bat Detectors recording the number of bat passes within one defined area for the duration of a single night. A total of ten nights data was collected from across the study site with 720 passes recorded. The majority of bats recorded were pipistrelle species except for five passes from Myotis species. These were recorded at Balnagubs Burn, Limpet Burn and Fishermyre.

3.3.12 Commuting routes where bat activity was observed between Habitat Areas involved linear features as follows: along the tree line beside the B979, along Megray Burn and the track beside Megray Farm Steading, around the edges of Megray Woods, along Limpet Burn; along the road beside Standingstones, along the road and track to the north of Strathgyle Cottage, along the Burn of Muchalls, along the tree lined track from Elrick to the Burn of Muchalls, along a tree lined field drain north of Elrick, along the tree lined road to the north of Cookney, and along the tree lined track adjacent to West Town of Newhall.

3.3.13 The majority of observations were of soprano and common pipistrelle bats which are the commonest bats in the region, although brown long-eared bats were recorded at Elrick and Daubenton's bats were recorded over the Burn of Muchalls and at the water-filled quarry to the south of Crossley, on the study area boundary.

3.3.14 All potential habitats of high value to foraging bats were surveyed during night time activity surveys.

3.3.15 Feeding behaviour was observed in specific and predictable areas including at woodland edges and over water features such as burns and lochs (Walsh, 1996a and 1996b). The lowest activity was observed in areas of high intensity arable agricultural land and industrial/residential areas with little vegetation and areas isolated from roost opportunities or linear habitat features.

3.3.16 Car transect surveys identified hotspots of bat activity in a number of locations in the Fastlink (shelterbelts along the B979, Cookney and Harecraig, Newhall, Quoscies, Wedderhill and Craigentath) where there is shelter and foraging opportunities, but revealed no Leisler's bat activity.

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 (where R denotes roost or potential roost, C – commuting or potential commuting, F – foraging or potential for foraging). Where bats were observed using a feature within a Habitat Area, the importance of the area was assessed for each species recorded as present 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 2.4. Each Habitat Area has been evaluated separately, but it should be noted that bats are highly mobile and that they may travel many kilometres in a night between roosts and foraging areas, and that different species and different groups within each species are likely to overlap. As such, the value of each Habitat Area for bats is likely to have been assessed as being lower than the value of all the habitats in the Section combined.

4.1.2 The proposed scheme runs predominantly through agricultural land managed for pasture and arable farming. Many of the woodlands within the survey area are coniferous plantation, which is considered to be of low inherent value to bats. Entwhistle et al. (2001) note that whilst they do not provide good roosting opportunities, some coniferous woodland can provide high insect abundance and foraging habitat for species including pipistrelles and brown long-eared bats. However, there are other areas of suitable habitat including broadleaved woodland, tree lines and water features which are important because of their inherent value for bats seeking insect prey or roost sites, including Daubenton's bats and Natterer's bats. They are also important at a greater spatial scale due to their position and interconnection with habitats in the wider landscape including those in the Southern Leg of the proposed scheme (see Part 1 of this report).

Section FL1

4.1.3 Of the 11 Habitat Areas in this section, one has been evaluated at less than local, seven of local, two of county and one of regional importance to bats. These evaluations reflect the presence of locally significant populations of locally important species including pipistrelle and Daubenton's bats at features including shelterbelts, woodlands, heathland and burns in the Section, with county significant numbers of bats or features of above local significance to bats at Limpet Burn and Fishermyre. A number of roosts for pipistrelle bats were present in the far south of Section FL1, one of which, at Mains of Ury, is used in the autumn and potentially provides the features that bats require during the winter for hibernation when bats are vulnerable to disturbance. Such roosts in close proximity to features which provide shelter for foraging and commuting (also including Cowie Water) is important in maintaining the bat populations throughout the year. They reflect the regional importance of such features to bats due to their scarcity, especially as they potentially provide the features that bats require during the winter for hibernation.

4.1.4 The evaluation of Habitat Areas in Section FL1 is shown in Table 16.

Table 16 – Evaluation of Habitat Areas in Section FL1

Habitat Area	Actual Activity	Potential Activity [4]	Evaluation	Comments
F1	n/a	C	Local	Potential commuting routes along railway are likely to support locally significant populations of pipistrelle bats by providing linear habitat that connects potential roosting area in Stonehaven with foraging areas in the study area.
F2	F, C	R	Local	Mixed broadleaved shelter belt and road supports a locally significant number of foraging and commuting common and soprano pipistrelle bats.
F3	4R, F, C	R, F, C, H	Regional	Four building roosts at new Mains of Ury farmhouse and farm, Megray Farm Steading and Forester's Croft, and commuting routes along B979, Megray Burn and access road to Megray Farm as per F2 and F4 maintain county significant populations of common and soprano pipistrelle bats due to the number of roosts supported in the Habitat Area. The presence of roosting bats during the autumn and potentially winter when bats are most vulnerable appreciably enriches the regional habitat resource for these species, especially given the proximity to Cowie Water which is likely to be a regionally significant foraging resource.
F4	F	C	Local	Site in combination with F3 supports locally significant populations of foraging and potentially commuting common and soprano pipistrelle bats as H-Ram Wood is the only sheltered foraging area for up to 500m.
F5	C	F, R	Local	Mixed broadleaved shelter belt supports locally significant populations of commuting common and soprano pipistrelle bats as per F2/F3. Site appreciably enriches the biodiversity resource in the local context by providing sheltered foraging habitat and potential roost sites.
F6	F, C	R	Local	Megray Wood conifer plantation in combination with more species-rich habitat in F7 supports a locally significant population of foraging and commuting common and soprano pipistrelle bats.

[4] R=Roosts, F=Foraging, C=Commuting

Habitat Area	Actual Activity	Potential Activity 4	Evaluation	Comments
F7	F, C	R	County	Megray Burn and Limpet Burn and associated habitats appreciably enrich the county habitat resource by providing sheltered linear habitat connecting potential roosting sites on both sides of the proposed scheme and high value foraging habitat. Limpet Burn supports locally significant populations of foraging and commuting common and soprano pipistrelle and Daubenton's bats, and the road through Megray Wood supports foraging and some commuting pipistrelle bats.
F8	C	R	Local	The site supports a locally significant population of commuting common pipistrelle bats although alternative such routes exist in the vicinity, and there are a number of roost opportunities in farm buildings and associated buildings.
F9	n/a	n/a	Less than local	Exposed hillside with very little surrounding habitat of value to bats and limited ecological importance due to lack of foraging, commuting or roosting opportunities. These are provided by woodlands within the nearby F7 and F10.
F10	C, F	R	County	Fishermyre Wood South broadleaved woodland, scrub and heath and the road to the north of the Habitat Area and Green Burn supports county significant populations of foraging and commuting common and soprano pipistrelle and Daubenton's bats, enhancing the habitat resource to county level.
F11	C,F	n/a	Local	The area supports a locally significant population of common pipistrelle bats and provides foraging habitat considered to appreciably enrich the habitat resource.

Section FL2

4.1.5 Of the five Habitat Areas in this section, one has been evaluated at local, two of county and two of regional importance to bats. The two Habitat Areas considered to support regionally significant bat populations may support bats during hibernation and are strategically located close to excellent areas of foraging habitat located at the Burn of Muchalls, and Red Moss of Netherley (to the west of the study area). The two Habitat Areas considered to support county significant numbers of bats have small roosts which are not considered to maintain bats at sensitive times of the year, and also provide linear features enabling bats to commute between the best quality habitats, and providing linkage between these habitats which is considered to enrich the resource at above local level.

4.1.6 The evaluation of Habitat Areas in Section FL2 is shown in Table 17.

Table 17 – Evaluation of Habitat Areas in Section FL2

Habitat Area	Actual Activity	Potential activity 5	Evaluation	Comments
F12	F, C		County	The scrub and tree lined edges of this heath habitat and the road to the south supports county significant populations of common and soprano pipistrelle and Daubenton's bats as per F10. The heath and woodland habitats and the commuting route between Fishermyre and the Burn of Muchalls are considered to enrich the county habitat resource.
F13	1R, F, C	R	County	The roost at Woodview maintains a population of bats (species unknown) which, in combination with the provision of alternative roost locations in buildings and culverts is likely to support county significant populations of bats including those which forage in adjacent Habitat Areas at the Burn of Muchalls and Fishermyre, and to enhance the roosting habitat resource at above local level.
F14	n/a	F, C	Local	Heath habitat and linear features around and within it considered to appreciably enrich the habitat resource within the local context.
F15	2R, F, C	R, H	Regional	The roosts at Burnorrachie Croft and Burnside maintain populations of soprano pipistrelle bats. The roost at Burnside may maintain the resident bat population in the winter during hibernation when they are most vulnerable. The Burn of Muchalls and associated riparian habitats and standing water support county significant populations of pipistrelle bats and potentially Daubenton's bats and act as a commuting route between Red Moss of Netherley and resources to the east of the proposed scheme.
F16	7R, F, C	R, H	Regional	The roosts at Cookney Grange, Elrick, Cookney Farmhouse, the bungalow, Kirkton and Cairnlea maintain populations of soprano pipistrelle and potentially brown long-eared bats; the roost at the bungalow is likely to b a maternity roost maintaining the resident population at a sensitive time of the year. The culvert maintains a small population of Daubenton's bats.

Section FL3

4.1.7 Of the 11 Habitat Areas in this section, five are considered to be of local importance, five of county importance and one of regional importance. The habitats assigned regional significance all contain roosts which are likely to maintain county significant populations of locally important bat species (pipistrelles and potentially brown long-eared bats) at sensitive or vulnerable times of the annual cycle (during the winter hibernation period or summer maternity roost). Cookney village supports a number of roosts reflecting the overall high suitability of the buildings and trees for maintaining roosting and foraging bats. The Habitat Areas assigned to county significance support county significant numbers of bats or features including commuting routes which are considered to enhance the biodiversity resource at above local level. Most Habitat Areas in this Section support locally significant numbers of bat species which were recorded foraging and commuting at features including shelterbelts, woodlands and water features which, although they are generally small and fragmented they are widespread and linear features between key habitat areas provide connectivity through the landscape.

4.1.8 The evaluation of Habitat Areas in Section FL3 is shown in Table 18.

[5] R=Roosts, F=Foraging, C=Commuting

Table 18 – Evaluation of Habitat Areas in Section FL3

Habitat Area	Actual Activity	Potential Activity 6	Evaluation	Comments
F17	2R, F, C	R	County	The roosts at Hillend and in one of the barns at Mains of Cookney maintain a county significant population common pipistrelle bats not considered to support maternity roosts. The buildings are considered to enrich the county habitat resource by providing roost opportunities in an area where other similar roosting opportunities exist. Shelterbelt, heath and scrub habitat in this habitat area is considered to enrich the county foraging and commuting habitat resource, and the commuting and foraging route along the road through Cookney supports county significant populations of bats as per F16/F18.
F18	2R, F, C	R	Regional	The roost at North Cookney Croft, in the southern part of this Habitat Area, maintains a county significant population of common pipistrelle bats. The roost is likely to be a maternity roost so the building provides particular conditions which are scarce in the area. In addition swarming activity at North Cookney Farm and North Rothnick Farm in autumn indicates that a hibernation site may exist nearby. Another anecdotal roost at West Stoneyhill is also likely to support a colony of pipistrelle bats. Commuting routes at the road through Cookney and West Town of Newhall connect Habitat Areas, and field drains around Rothnick provide some foraging opportunities supporting the bat population.
F19	n/a	F, C	Local	The scrub and woodland north of Harecraig supports a locally significant population of foraging pipistrelle bats and may support the same bat populations commuting from roosts in Cookney and West Stoneyhill.
F20	F	C	Local	Crossley Quarry Pond supports a locally significant population of Daubenton's bats and soprano pipistrelle bats.
F21	2R, F, C	R	County	Roosts at Crossley and Crossley Farm Steading and surrounding foraging habitat maintain a county significant population of pipistrelle bats but are not likely to support maternity roosts. The road toward the quarry pond is likely to be a commuting route.
F22	1R, F	C	County	The roost at Altries Manse supports a county significant population of common pipistrelle bats not considered to support a maternity roost. The roost and commuting route adjacent are considered to enrich the biodiversity resource at above local level.
F23	n/a	F, C	Local	Scrub and heath habitats considered to appreciably enrich the local foraging habitat resource and extend the foraging resource provision of F21 close to the roost at Altries Manse.
F24	n/a	F, C	Local	Scrub, heath, wet and wooded habitats considered to appreciably enrich the local foraging habitat resource and extend the foraging resource provision of F21 close to the roost at Altries Manse as well as connecting foraging habitats at Craigentath Wood and features to the west of the proposed scheme.
F25	n/a	C	Local	Plantation woodland edges and road considered to appreciably enrich and extend the local foraging and commuting habitat resource as per F26 close to the roost at Altries Manse (F21) and connecting foraging habitats at Craigentath Wood and features to the west of the proposed scheme.

[6] R=Roosts, F=Foraging, C=Commuting

Habitat Area	Actual Activity	Potential Activity 6	Evaluation	Comments
F26	1R, F	R	County	An old barn at Greens of Crynoch likely to support and maintain a county significant population of bats; commuting route along the road supports pipistrelle bats commuting between roosting and foraging habitats.
F27	F, C	n/a	County	Crynoch Burn and associated habitats are considered to appreciably enrich the habitat resource at above local level and support county significant populations of foraging and commuting common and soprano pipistrelle and Natterer's bats as per Part 1 of this report , Habitat Areas S19 and S22, connecting foraging and roosting habitat in Red Moss of Netherley to the south and Kingcausie and the River Dee to the north.

Evaluation Summary

4.1.9 Over the whole of the study area, one Habitat Area was considered to be of less than local, four of local, 13 of county and nine of regional importance. All of the Habitat Areas considered to be of regional value are bat 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 such 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 that they provide. The one area of less than local importance to bats was considered to lack any significant resources suitable for roosting, foraging or commuting.

4.1.10 All three geographical sections within the study area are considered to be of value due to the size, quality and nature of habitats they provide and the number of bats observed. Similar numbers of bats were recorded within each section although the number of identified and potential roosts is highest in Section FL1. This section however is not considered to be of higher than regional value due to the fragmented nature of the habitats in the area and the small size of roosts identified.

5 Potential Impacts

5.1 Introduction

5.1.1 The following assessment addresses the potential impacts of the proposed AWPR scheme (in the absence of 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 impact associated with road schemes and DMRB outlines potential impacts resulting from roads and bridges (Highways Agency, 2001). These guidelines identify 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 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 might have on bat communities in the area. Bats are sensitive to discrete changes in habitat and any impacts which reduce the availability and accessibility of habitat components, including good quality foraging habitats; and any impacts which affect their ability to navigate between such habitats is likely to have an adverse effect on the distribution of bats through the landscape or the number of bats that can be supported by each area of key habitat.

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, the assessment takes account of the fact 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 affected. 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 could 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 AWPR Environmental Statement 2007).

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 might 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 (Highways Agency, 2001). However, the risk would increase where the proposed 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 1 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 /roosts 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 (Highways Agency, 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 1996b) 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 features must be taken into consideration when predicting the impacts of a development (Warren et al., 2000).

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 effect. The locations of construction compounds are not known at the time of writing, 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 might 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 might 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. Direct impacts on bats' use of roost sites is considered negligible at distances over 50m provided there are no impacts on the availability of nearby shelter or commuting routes.

5.2.11 Habitat enhancement may be an indirect result of construction, for example the provision of detention basins for the settling of road runoff might 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 roosts / roost access, highway schemes may damage foraging habitat either by direct land-take and fragmentation as below, or by indirectly severing commuting routes form 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 Road Traffic Accidents (RTAs) as per the direct mortality 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 might be exacerbated by the patchiness of roosts and foraging areas used by bats. Severance of commuting corridors and removal of sheltered flyways between patches might 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. Locations of certain 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.

Operation

5.2.16 Where the road or junctions would pass directly through habitat used by bats, areas 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 might 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 moving traffic which may 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 might 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 or travel long distances between them. Similarly, the new road might 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 be likely to 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 might 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 might cause disruption of foraging and commuting behaviour (Rydell and Racey, 1993). In particular the use of lighting close to a roost might influence emergence behaviour and activity. Bright light could cause bats to move away from an area or to desert a roost.

5.2.21 Habitat modification during construction would result in changes to micro-environmental conditions including temperature and humidity regimes. As well as affecting roost suitability such modification might 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). Directional lighting will be provided at junctions and certain underpasses, however the majority of the route will not be lit. Carriageway lighting can 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 (Highways Agency, 2001). Colonial habits of bats and their dependence on buildings and similar structures for roosting also make them vulnerable to repair work (Schofield and Mitchell-Jones, 2003).

Pollution

Construction

5.2.24 During construction, fluctuation in water regimes in burns, lochs and wetland areas can 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 cause modifications to the channel bed morphology and water turbidity, and mitigation is therefore proposed as per Water Environment and Freshwater Ecology reports in Chapter 39 and Appendix A40.9 of the AWPR Environmental Statement 2007, respectively. In the absence of mitigation 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 A40.6 and A40.10 of the AWPR Environmental Statement 2007) and are therefore not covered in detail in this report.

5.2.25 The introduction of dust and particulate matter (PM_{10}) 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 might 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 might 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 of the AWPR Environmental Statement 2007, and mitigation is proposed to address these impacts.

5.2.27 Maintenance of the highway, such as resurfacing, might 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 might potentially provide 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 some existing roads. 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 volumes along existing roads might thereby help to reduce direct road mortality on these roads. However, this beneficial impact is unlikely to outweigh direct mortality as a result of other impacts caused by the road.

5.2.32 The impacts identified in this report refer only to the potential to affect bats and their behaviour and viability. The impacts on the inherent ecological value of the habitats in question can be found in the Terrestrial Habitats report (Appendix A40.1 of the AWPR Environmental Statement 2007) and the Freshwater Reports (Appendix A40.9 of the AWPR Environmental Statement 2007).

5.3 Specific Impacts

Section FL1

5.3.1 During construction, there is a risk of direct mortality where the road would pass through Megray Wood at Limpet Burn (county importance) due to the presence of potential roosts in trees. These impacts have been assessed as being of high negative magnitude and Moderate significance.

5.3.2 Habitat loss would be an issue at Megray Burn (regional importance), H-Ram Wood (local importance), Megray Wood (local importance) Limpet Burn and Fishermyre Wood South (county importance). At these locations the loss of foraging habitats would result in alteration of the suitability of these areas to support bats and would result in an impact of medium magnitude and Moderate significance at Megray Burn; medium magnitude and Minor significance at H-Ram Wood; low negative magnitude and Minor significance at the edge of Megray Wood; and medium magnitude and Moderate significance at Limpet Burn and Fishermyre Wood South.

5.3.3 Fragmentation would potentially be an issue at Megray Burn and the farm access track where commuting routes would be severed. At Limpet Burn the eastern edge of Megray Wood would be fragmented, and at Fishermyre Wood South construction would result in severance of another commuting route. Impacts of medium negative magnitude and Moderate significance are predicted.

5.3.4 There is some potential for disturbance to bats roosting at New Mains of Ury during junction construction (impacts of low negative magnitude and Minor significance). If night works are required, disturbance to the behaviour patterns of foraging and commuting bats is likely at H-Ram Wood (impacts of medium negative magnitude and Minor significance), at Limpet Burn, and at Fishermyre Wood South (impacts of medium negative magnitude and Moderate significance,; low negative magnitude and Minor significance respectively). Disturbance is also likely during bridge construction at Limpet Burn.

5.3.5 During operation of the road, there would be a risk of direct mortality as a result of the proposed scheme severing known commuting routes along Megray Burn; the access track to Megray Farm Steading (impacts of medium negative magnitude and Moderate significance); and at Fishermyre Wood South (impacts of high negative magnitude and Moderate significance). At Limpet Burn access will be retained beneath the proposed bridge and the road through Megray Wood would also be retained, providing a safe crossing point for foraging and commuting bats. Impacts of direct mortality are therefore predicted to be of negligible magnitude and Negligible significance at this location.

5.3.6 Habitat loss of burn and woodland habitats along Megray Burn and at H-Ram Wood is likely to result in impacts of medium negative magnitude and Moderate (Megray Burn) to Minor significance on the local bat population, due to the removal of the woodland and riparian habitats. The loss of high value foraging and roosting habitat at the eastern edge of Megray Wood, adjacent to Limpet Burn, and at Fishermyre Wood South is predicted to result in impacts of medium negative magnitude and Moderate significance.

5.3.7 Significant effects from severance of commuting routes are likely where the road bisects the commuting route along the farm access track at Megray Burn (impacts of low magnitude and Minor significance as alternative commuting routes exist), and at the road north of Fishermyre Wood South, where foraging and roosting areas are likely to be made less accessible by the road. The proposed realignment of Megray Burn will mean that the commuting and foraging route would be reinstated in the long term. The buried structure at Limpet Burn would be high enough to enable bats to continue using the structure and impacts here are therefore assessed to be of negligible magnitude and Negligible significance.

5.3.8 Some disturbance may occur as a result of junction lighting at Megray Burn and H-Ram Wood, but impacts are anticipated to be of Minor significance since there would be no permanent change to the evaluation of the Habitat Area. Disturbance of foraging behaviour would also be predicted at Megray Wood (impacts of medium magnitude and Moderate significance) and Fishermyre Wood (impacts of low negative magnitude and Minor significance). Pollution incidents could result in impacts of medium negative magnitude and Moderate significance at Megray Burn, Limpet Burn and the drainage network at Fishermyre if the suitability of downstream resources for foraging habitat, including Cowie Water, Limpet Ponds and Green Burn, is compromised.

5.3.9 The assessment of impacts in Section FL1 is shown in Table 19.

Table 19 – Assessment of Potential Impacts Section FL1

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
F1	Local	0 – 500m	Construction / Operation	No impacts predicted due to retention of habitats.	Negligible	Negligible
F2	Local	200 – 500m	Construction / Operation	No direct impacts predicted due to distance from scheme.	Negligible	Negligible
F3	Regional	0 – 500m	Construction	No direct mortality predicted due to absence of roosts on alignment.	Negligible	Negligible
				Loss of Megray Burn and associated scrub, wet habitats and foraging/commuting potential due to burn realignment.	Medium Negative	Moderate
				Severance of burn and commuting routes will alter distribution of bats in locality.	Medium Negative	Moderate
				Disturbance of foraging and commuting pipistrelle bats likely due to burn realignment, and disturbance of roosting bats possible due to construction close to roosts at Mains of Ury.	Low Negative	Minor
				Pollution of Megray Burn and associated reduction in invertebrate prey availability due to burn realignment.	Medium Negative	Moderate
			Operation	Direct mortality predicted due to RTA due to permanent severance of commuting route although alternative commuting routes exist.	Low Negative	Minor
				Long term loss of foraging and commuting habitat predicted due to realignment of burn.	Medium Negative	Moderate
				Permanent severance of probable commuting route along Megray Farm Steading access track but alternative commuting routes exist at A90 junction and from Megray Wood. Commuting route along realigned Megray Burn will be retained.	Low Negative	Minor
				Possible disturbance of roosting bats due to junction lighting.	Low Negative	Minor
				Pollution of Megray Burn and associated reduction in invertebrate prey availability due to runoff from the scheme.	Medium Negative	Moderate
F4	Local	0m	Construction / Operation	No direct mortality predicted due to low roost potential of H-Ram Wood.	Negligible	Negligible

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
				Loss of woodland and associated sheltered foraging habitat will reduce overall suitability of area to support pipistrelle bat population but alternative foraging resource exists.	Medium Negative	Minor
				No fragmentation predicted due to loss of entire wood.	Negligible	Negligible
				Disturbance likely to affect foraging behaviour of bats during construction and operation.	Medium Negative	Minor
				Pollution of Megray Burn assessed above for F3.	Negligible	Negligible
F5	Local	400 – outwith study area	Construction / Operation	No direct impacts predicted due to distance from scheme.	Negligible	Negligible
F6	Local	0 – 500m	Construction / Operation	No direct mortality predicted due to low roost potential of Megray Wood and retention of crossing point/flyway during operation.	Negligible	Negligible
				Loss of strip of conifer plantation woodland from eastern edge of Megray Wood will reduce suitability of foraging/edge habitat in the short term and proximity to road will reduce overall suitability for foraging.	Low Negative	Minor
				No fragmentation predicted due to loss of habitat from extreme edge of woodland and retention of flyway along road through woodland.	Negligible	Negligible
				Disturbance likely to affect foraging behaviour of bats during construction and operation.	Medium Negative	Minor
				No pollution of watercourses likely due to distance from proposed scheme.	Negligible	Negligible
F7	County	0m – outwith study area	Construction	Direct mortality possible if bats are roosting in trees to be felled.	High negative	Moderate
				Loss of wetland, scrub and sheltered foraging and commuting habitat along Limpet Burn due to construction of buried structure.	Medium Negative	Moderate
				Severance of probable commuting route along Limpet Burn during construction of buried structure.	Medium Negative	Moderate
				Disturbance likely to affect foraging behaviour of bats during construction of buried structure.	Medium Negative	Moderate
				Potential pollution of Limpet Burn and associated reduction in suitability of wetland habitats to support invertebrate prey for local pipistrelle and Daubenton's bat populations.	Medium Negative	Moderate

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
			Operation	No direct mortality predicted as buried structure will be high enough for bats to fly through.	Negligible	Negligible
				Permanent loss of wetland and scrub habitats under buried structure and due to burn realignment.	Medium Negative	Moderate
				No permanent severance of commuting route likely due to retention of flyway under the bridge; severance of potential commuting route along road through Megray Wood.	Negligible	Negligible
				Bats unlikely to be disturbed during operation due to lack of lighting on the burn and valley.	Negligible	Negligible
				Pollution of Limpet Burn and associated reduction in invertebrate prey availability due to runoff from the scheme.	Negligible	Negligible
F8	Local	0 – 500m	Construction / Operation	No direct mortality predicted due to distance of potential roosts from proposed scheme.	Negligible	Negligible
				No habitat loss predicted as proposed scheme passes through area of farmland with inherently low value to bats.	Negligible	Negligible
				No habitat fragmentation or severance predicted due to low value of farmland habitat; adjacent commuting routes assessed as per F6, F7, F10 and F12.	Negligible	Negligible
				No disturbance predicted due to absence of roosts on alignment and retention of adjacent features of value to foraging and commuting bats.	Negligible	Negligible
				No pollution predicted during construction or operation due to absence of watercourses.	Negligible	Negligible
F9	Less than local	100m - outside study area	Construction / Operation	No direct impacts predicted due to distance from proposed scheme and lack of resources for bats.	Negligible	Negligible
F10	County	0 – 400m	Construction	No direct mortality predicted due to absence of roosts and low overall roosting value of features on alignment.	Negligible	Negligible
				Temporary loss of high value woodland, scrub, heath and wet foraging habitat used by pipistrelle and Daubenton's bats.	Medium Negative	Moderate
				Fragmentation of foraging area and severance of potential commuting route along road between Fishermyre and the Burn of Muchalls will isolate habitats either side of the scheme.	Medium Negative	Moderate

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
				No disturbance of roosting bats due to absence of roosts on alignment but disturbance during construction of embankment likely to affect foraging behaviour of bats.	Low Negative	Minor
				Potential pollution of Green Burn and wet habitats and alteration of hydrological regime and habitat suitability for foraging bats.	Medium Negative	Moderate
			Operation	Direct Mortality due to RTA possible if bats continue to use the road to commute between habitats either side of the proposed scheme and despite provision of U88K road there is no guarantee of bats using the crossing.	High Negative	Moderate
				Permanent loss of woodland, scrub and wet habitats due to operation of road.	Medium Negative	Moderate
				Fragmentation of foraging area and severance of commuting route will reduce accessibility of habitat areas either side of the proposed scheme if bats cannot cross.	Medium Negative	Moderate
				Reduced suitability of foraging area due to disturbance from traffic.	Low Negative	Minor
				Pollution of Green Burn and reduced suitability of foraging habitats due to runoff from scheme.	Medium Negative	Moderate
F11	Local	300 – 500m	Construction / Operation	No direct impacts predicted due to distance from proposed scheme.	Negligible	Negligible

Section FL2

5.3.10 During construction, direct mortality has been identified as a potential impact along the Burn of Muchalls (regionally important bat populations) where a number of trees with roost potential have been identified. The potential impacts associated with the felling of these trees have been assessed as being of low negative magnitude and Minor significance to local bat populations as there are relatively few features suitable for bats to roost.

5.3.11 Habitat loss due to construction activities is assessed as being of medium negative magnitude and Moderate significance at Fishermyre (county importance) and the Burn of Muchalls due to the loss of foraging habitat as a result of clearance for access and plant.

5.3.12 Fragmentation of the road at Fishermyre, the Burn of Muchalls and the road through Cookney (regional significance) during construction is likely to disrupt commuting routes and make roosts and foraging resources either side of the road less accessible. This is predicted to result in impacts of medium negative magnitude and Moderate significance.

5.3.13 Disturbance of roosting bats would be likely to occur at Woodview and Elrick Farms where roosts have been identified within 200m of the proposed scheme, particularly if site compounds are sited nearby. These impacts have been assessed as being of medium negative magnitude and Moderate significance. Disturbance of foraging bats at Fishermyre would be likely to result in impacts of low negative magnitude and Minor significance. Pollution of burns and consequent alteration of downstream habitat suitability for foraging would be predicted if there were spills during construction with impacts of medium negative magnitude and Moderate significance on the local bat populations at Fishermyre and the Burn of Muchalls, and low negative magnitude and Minor significance at the Burn of Blackbutts.

5.3.14 During operation, direct mortality due to RTA may occur along the road to the south of Fishermyre Wood and the road through Cookney as a result of severance of commuting routes. These potential impacts have been assessed as being of high negative magnitude and Moderate (Fishermyre) to Major significance (Cookney). There are not predicted to be any significant impacts at the Burn of Muchalls since the proposed buried structure would have a high span that bats could fly underneath uninterrupted.

5.3.15 Permanent habitat loss and the alteration of suitable habitat for foraging bats would occur at Fishermyre where heath and wet habitats suitable for pipistrelle and Daubenton's bats exists, resulting in impacts of medium negative magnitude and Moderate significance. Loss of habitat at the Burn of Muchalls would have an impact on the suitability of the burn and riparian zone for foraging and commuting bats if provision is not made for bats to fly along the burn, but permanent loss is only likely to result in impacts of low negative magnitude and Minor significance.

5.3.16 The proposed scheme would cause the eastern edge of the heathland area north of Fishermyre to be fragmented and the commuting route along the road to be severed, with subsequent implications for foraging and commuting pipistrelle and possibly Daubenton's bats resulting in impacts of medium negative magnitude and Moderate significance on local bat populations. Severance of the Burn of Muchalls would result in the loss of habitat either side of the road if bats cannot cross, however the provision of a high-span bridge would be expected to permit unimpeded flight across the scheme with no significant impact on the bat population. The severance of a commuting route at Cookney would result in impacts of medium magnitude and Moderate significance on the populations of roosting bats in Cookney. This may effectively lose the foraging habitat resource on the opposite side of the road if they cannot cross safely. Potential impacts related to disturbance from traffic noise is anticipated to be of Minor significance. The potential for pollution of Fishermyre and associated wet habitats; the Burn of Muchalls and the Burn of Blackbutts from road runoff would reduce the suitability of the burns and downstream areas for foraging bats. These impacts are assessed as being of medium negative magnitude and Moderate significance at Fishermyre and the Burn of Muchalls, and of low negative magnitude and Moderate significance at the Burn of Blackbutts.

5.3.17 The assessment of impacts in Section FL2 is shown in Table 20.

Table 20 – Assessment of Potential Impacts Section FL2

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
F12	County	0 – 500m	Construction	No direct mortality predicted due to absence of roosts and low overall roosting value of features on alignment.	Negligible	Negligible
				Temporary loss of high value woodland, scrub, heath and wet foraging habitat used by pipistrelle and Daubenton's bats.	Medium Negative	Moderate
				Fragmentation of foraging area and severance of potential commuting route along road between Fishermyre and the Burn of Muchalls will isolate habitats either side of the scheme.	Medium Negative	Moderate
				No disturbance of roosting bats due to absence of roosts on alignment but disturbance during construction of embankment likely to affect foraging behaviour of bats.	Low Negative	Minor
				Potential pollution of Green Burn and wet habitats and alteration of hydrological regime and habitat suitability for foraging bats.	Medium Negative	Moderate
			Operation	Direct Mortality due to RTA possible if bats continue to use the road to commute between habitats either side of the proposed scheme and despite provision of U88K road there is no guarantee of bats using the crossing.	High Negative	Moderate
				Permanent loss of woodland, scrub and wet habitats due to operation of road.	Medium Negative	Moderate
				Fragmentation of foraging area and severance of commuting route will reduce accessibility of habitat areas either side of the proposed scheme if bats cannot cross.	Medium Negative	Moderate
				Reduced suitability of foraging area due to disturbance from traffic.	Low Negative	Minor
				Pollution of Green Burn and reduced suitability of foraging habitats due to runoff from scheme.	Medium Negative	Moderate
F13	County	0 – 500m	Construction / Operation	No direct impacts predicted due to scheme passing through farmland of inherently low value to bats; potential impacts on commuting routes discussed as per F10, F12 and F15.	Negligible	Negligible
F14	Local	250 – outside study area	Construction / Operation	No direct impacts predicted due to distance from scheme.	Negligible	Negligible

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
F15	Regional	0m – outside scheme	Construction	Direct mortality possible if bats are roosting in trees to be felled alongside the Burn of Muchalls; few bats likely to be affected due to low overall potential for roosting bats.	Low Negative	Minor
				Loss of riparian habitat and associated foraging opportunities and disruption to commuting route due to construction.	Medium Negative	Moderate
				Fragmentation of linear habitat along the Burn of Muchalls and severance of bat commuting route.	Medium Negative	Moderate
				Temporary disturbance of foraging and commuting bats during construction of buried structure.	Medium Negative	Moderate
				Potential pollution of the Burn of Muchalls due to construction.	Medium Negative	Moderate
			Operation	No direct mortality predicted as the buried structure will be high enough for bats to fly through unimpeded.	Negligible	Negligible
				Permanent loss of small section of riparian woodland due to buried structure.	Low negative	Minor
				No permanent fragmentation or severance of river corridor due to retention of flyway.	Negligible	Negligible
				No permanent disturbance predicted due to absence of lighting on the structure.	Negligible	Negligible
				Potential pollution of the Burn of Muchalls and downstream impacts on habitats and prey availability due to runoff from the road.	Medium Negative	Moderate
F16	Regional	0 – 500m	Construction	No direct mortality predicted due to the absence of roosts from the alignment.	Negligible	Negligible
				Habitat loss of farmland of inherently low value to bats in unlikely to have significant impact on local bat populations.	Negligible	Negligible
				Severance of commuting route along the road at Cookney will isolate habitats either side of the scheme including roosts in Cookney village and foraging habitats to the east, although alternative routes exist .	Medium Negative	Moderate
				Temporary disturbance of foraging and commuting bats likely during construction of cutting.	Medium Negative	Moderate
				Potential pollution of the Burn of Blackbutts and foraging habitat downstream during construction.	Low Negative	Minor

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
			Operation	Direct mortality possible if bats continue to fly along the road at Cookney during operation.	High Negative	Major
				Permanent loss of farmland habitat is unlikely to have a significant impact on the availability of foraging resources for bats.	Negligible	Negligible
				Permanent severance and fragmentation of roosting and foraging habitats due to the severance of commuting routes to the east of Cookney.	Medium Negative	Moderate
				No permanent disturbance of roosting or foraging bats likely due to the absence of resources along the alignment.	Negligible	Negligible
				Potential pollution of the Burn of Blackbutts due to runoff from the road.	Low negative	Minor

Section FL3

5.3.18 The risk of direct mortality as a result of clearance for construction is predicted to be of Negligible significance in this Section due to the absence of roosts directly under the alignment. Loss of scrub and riparian scrub habitat is anticipated to result in impacts of low negative magnitude and Minor significance at the burn network around Rothnick (county importance) and Greens of Crynoch (county/regional importance). Temporary fragmentation of linear commuting habitat at the road through Cookney and the road between Craigentath Wood and Crynoch Burn (county importance) would disrupt commuting activity and may reduce access to foraging and roosting resources either side of the road during construction.

5.3.19 The potential for disturbance exists where the proposed scheme would be within 50m of the common pipistrelle roost at North Cookney Croft. This impact is assessed as being of high negative magnitude and Major significance if the suitability as a roost is reduced or if a maternity colony is displaced due to the siting of construction works or compounds. Construction would be likely to result in changes in foraging behaviour around Stranog/Crossley and along the road between Craigentath Wood and Crynoch Burn. Potential pollution of watercourses and subsequent reduction in water quality would result in an impact of low magnitude and Minor significance at the Rothnick network (Balnagubs Burn and the Burn of Elsick) and Crossley (Cairns and Crossley Burns) and Square Burn.

5.3.20 The impacts of direct mortality would be considered significant where the scheme crosses the road at Cookney close to a pipistrelle roost at North Cookney Croft since roosting bats may fly into the path of oncoming traffic if a safe crossing is not provided. Similarly the severance of the commuting route between Craigentath Wood and Crynoch Burn may result in mortality due to RTA near a roost, resulting in impacts of high negative magnitude and Moderate significance on the local bat populations in these locations if bats do not use the proposed crossing points.

5.3.21 While the loss of foraging habitat is not considered to represent a significant impact on local bat populations in this section since most of the habitat is open, exposed and of relatively low inherent value (with the exception of impacts of low negative magnitude and Minor significance in agricultural fields south of Polston Farm (F26) where minor burns and drainage channels and their associated foraging potential will be severed), indirect impacts may include the effective loss of roosts if their suitability reduces (including probable maternity roost at North Cookney Croft). This would represent an impact of high magnitude and Major significance in this section.

5.3.22 Similarly, disturbance and impacts on bats commuting from this section would be predicted to be of high negative magnitude and Major significance if bats were unable to cross the road. If provision were not made for safe crossing at the road between Craigentath Wood and Crynoch Burn impacts of medium negative magnitude and Moderate significance would be predicted on the commuting behaviour since the local distribution of bats in the locality may change.

5.3.23 Potential pollution of the drainage networks at Rothnick and Crossley (impacts of low negative magnitude and Minor significance) and the burns running into Crynoch Burn (impacts of medium negative magnitude and Moderate significance due to the potential downstream impacts on Crynoch Burn) is also possible due to runoff from the road.

5.3.24 The assessment of impacts in Section FL3 is shown in Table 21.

Table 21 – Assessment of Potential Impacts Section FL3

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
F17	County	200 – 500m	Construction / Operation	No direct mortality impacts predicted due to distance from scheme.	Negligible	Negligible
				No direct loss of habitat predicted due to distance from scheme.	Negligible	Negligible
				Indirect severance of roosting habitats in Cookney from foraging habitats along commuting route to the east of the scheme due to construction and operation of the road.	Medium Negative	Moderate
				No disturbance to roosting bats predicted due to distance from the proposed scheme.	Negligible	Negligible
				No pollution predicted due to distance from the scheme and absence of watercourses in this Habitat Area.	Negligible	Negligible
F18	Regional	0 – 500m	Construction	No direct mortality predicted due to absence of roosts under the alignment.	Negligible	Negligible
				Minimal loss of scrub and riparian foraging habitat at field boundaries, Balnagubs Burn and the Burn of Elsick.	Low Negative	Minor
				Severance of roosting habitats in Cookney from foraging habitats along commuting route to the east of the scheme due to construction and operation of the road as per F16/F17.	Medium Negative	Moderate
				Disturbance of roosting bats likely at North Cookney Croft if bats roosting during construction, especially during maternity roost season.	High Negative	Major
				Potential pollution of Balnagubs Burn and the Burn of Elsick due to risk of spills during construction.	Low Negative	Minor
			Operation	Direct Mortality possible due to RTA due to severance of commuting route and close proximity of roost (probable maternity roost) to the road.	High Negative	Major
				Potential loss of roost at North Cookney Croft if roost characteristics change and displacement of probable maternity roost. Minimal loss of scrub and riparian foraging habitat at field boundaries, Balnagubs Burn and the Burn of Elsick.	High Negative	Major

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
				Severance of commuting routes between roost and foraging habitats would lead to indirect loss of habitats either side of the road if bats cannot cross safely at Cookney; alternative routes exist north-south; potential impacts at the C13K at Rothnick if bats use the road to commute.	High Negative	Major
				Disturbance of emerging, roosting., commuting and foraging bats due to operation of the road at North Cookney Croft.	High Negative	Major
				Potential pollution of Balnagubs Burn and the Burn of Elsick and downstream impacts on the foraging resource.	Low Negative	Minor
F19	Local	0m – outside study area	Construction / Operation	No significant impacts on local bat populations predicted due to absence of features of value to bats on the alignment; indirect impacts addressed for adjacent habitats.	Negligible	Negligible
F20	Local	0m – outside study area	Construction / Operation	No significant impacts on local bat populations predicted due to absence of features of value to bats on the alignment; indirect impacts addressed for adjacent habitats.	Negligible	Negligible
F21	County	0 – 400m	Construction / Operation	No significant impacts on local bat populations predicted due to absence of features of value to bats on the alignment; indirect impacts addressed for adjacent habitats.	Negligible	Negligible
F22	County	0m – outside study area	Construction	No direct mortality predicted due to absence of roosts on the alignment.	Negligible	Negligible
				No significant loss of valuable bat habitat as scheme passes through low value farmland.	Negligible	Negligible
				Scheme will sever commuting route and isolate roost at Altries Manse from foraging opportunities in Craigentath Wood, although alternative foraging resources exist on the same side of the scheme.	Medium Negative	Moderate
				Reduced suitability of foraging area due to disturbance during construction.	Low Negative	Minor
				Potential pollution of burns during construction of scheme .	Low Negative	Minor
			Operation	Direct mortality due to RTA due to severance of commuting route.	High Negative	Moderate
				No significant loss of habitat predicted due to scheme passing through low value farmland.	Negligible	Negligible

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
				Scheme will sever commuting route and isolate roost at Altries Manse from foraging opportunities in Craigentath Wood, although alternative foraging resources exist on the same side of the scheme.	Medium Negative	Moderate
				Reduced suitability of foraging area due to disturbance from traffic.	Low Negative	Minor
				Potential pollution of burns during operation of scheme.	Low Negative	Minor
F23	Local	0 – 400m	Construction / Operation	No significant direct impacts predicted due to scheme running through low value farmland; indirect effects assessed for adjacent habitats.	Negligible	Negligible
F24	Local	400m – outside study area	Construction / Operation	No direct impacts predicted due to distance from scheme; indirect effects assessed for adjacent habitats.	Negligible	Negligible
F25	Local	0 – 450m	Construction / Operation	No direct mortality predicted due to lack of roost potential in woodland.	Negligible	Negligible
				Loss of low value conifer plantation woodland due to felling for construction.	Negligible	Negligible
				Severance of commuting route assessed as for F22/F26.	n/a	n/a
				Reduced suitability of woodland edge habitat for foraging due to disturbance during construction and from traffic.	Low Negative	Minor
				Potential pollution of Square Burn and downstream impacts on Crynoch Burn and associated foraging habitats.	Low Negative	Minor
F26	County	0m – outside study area	Construction	No direct mortality predicted due to absence of roosts on alignment.	Negligible	Negligible
				Minimal temporary loss of foraging habitat along burns.	Low Negative	Minor
				Severance of commuting route may isolate roost at Greens of Crynoch from foraging opportunities at Craigentath Wood, although alternative foraging resources exist on the same side (Crynoch Burn and Kingcausie).	Medium Negative	Moderate
				Disturbance of foraging and commuting pipistrelle bats likely due to construction.	Low Negative	Minor
				Potential pollution of burns and field ditches due to construction with potential downstream impacts on foraging resource at Crynoch Burn.	Medium Negative	Moderate

Habitat Area	Evaluation	Distance from scheme (m)	Phase of Scheme	Impacts	Impact Magnitude	Impact Significance
			Operation	Direct Mortality due to RTA along a commuting route between a roost and foraging area if bats unwilling to use crossing.	High Negative	Moderate
				Minimal permanent loss of potential foraging habitat along burns due to operational scheme.	Low Negative	Minor
				Permanent severance of pipistrelle bat commuting route along road and effective isolation of foraging and roosting habitats if bats cannot cross.	Medium Negative	Moderate
				Operational scheme may result in disturbance of foraging and commuting behaviour.	Low Negative	Minor
				Potential pollution of burns and field ditches due to operation with potential downstream impacts on foraging resources at Crynoch Burn.	Medium Negative	Moderate
F27	County	350m – outside study area	Construction / Operation	No direct impacts predicted due to distance from the scheme; indirect impacts on foraging resource availability at Crynoch Burn have been assessed above.	Negligible	Negligible

6 Mitigation

6.1 Introduction

6.1.1 This section of the report outlines measures to prevent / avoid, reduce or offset the adverse effects of the proposed scheme on the bat species and habitat features. 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 Habitat Management for Bats (Entwistle et al., 2001) and the DMRB (HA 80/99) as well as British Standards and National Planning Policy Guidelines (NPPG), consultation with the Aberdeen Bat Group and SNH and professional judgement were used in determining the design of mitigation measures for bats. In particular, The Bat Mitigation Guidelines (Mitchell-Jones, 2004) were used to establish the level of mitigation required according to the status of roosts.

6.2 Generic Mitigation

6.2.1 Generic mitigation measures to be adopted across the scheme are described in Table 22. A precautionary approach has been adopted whereby generic mitigation has been recommended wherever adverse impacts on bats and bat populations has been 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 and to ensure that the targets and objectives of the UK and local BAPs are met and there is no overall decline in bat populations.

6.2.2 A pre-construction Bat Mitigation Strategy (Species Management Plan) 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 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 measures required to prevent / avoid, 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 SNH.

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.

Table 22 – Generic Mitigation Measures

Impact	Mitigation type	Construction
Direct mortality	Prevent	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 must take into account findings of examination. If bats are likely to be disturbed, works must cease and advice must be sought from SNH including an application for a SEERAD licence (Highways Agency, 2001). Felling and demolition must be carried out by experienced contractors and under the supervision of licensed bat workers. Trees with roost potential must 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 must 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. Road traffic casualties must 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. Crossing points include 'up and over' hedges and trees between 2-6m high, alterations to proposed underpasses (see Badger report in Appendix A40.2 and Otter report in Appendix A40.5 of the AWPR Environmental Statement 2007) 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.
	Reduce	Demolition and felling must 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. Monitoring of bats' use of crossings including underpasses, overbridges and culverts must 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 requisite of operational aftercare management contracts.
	Offset	Where current or past signs of bat roosts are discovered in trees or buildings to be unavoidably removed, replacement roosts must be provided and monitored with emergence counts prior to removal. Removal of roosts must 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 (Highways Agency, 2001). The site specific exclusion methods will be detailed as part of the licence agreement. Where alternative crossing points are provided, tree planting must be positioned to guide bats toward the crossing point. In locations not identified as crossing points, roadside planting must use trees which do not produce nectar or attract insect prey and must be at least 10m from the road to ensure bats do not try to cross (Lemaire and Arthur, 1999).
Habitat loss	Prevent	Habitat loss will be prevented by removal of trees and buildings only where there is no alternative, and within the minimum area necessary. Works compounds, storage sites and access roads must be located at least 30m from roosts and avoid areas of woodland, wetland and scrub to prevent degradation of valuable bat habitat. Where loss or degradation of valuable habitat is unavoidable and where watercourses are realigned they must be returned to their former quality or improved once construction is complete. Works must follow BS 5837 (1991) guidance for trees in relation to construction, to avoid damage to the tree. Trees to be retained must be safeguarded from damage according to BS 5837 (1991).
	Reduce	Some felled trees must be left in areas of woodland clearance to provide foraging habitat and egg laying habitat for insect prey larvae. Loss of aquatic habitats must be kept to a minimum, including retention of bankside vegetation, natural water features including pools and riffles and dredging must be kept to a minimum as it destroys vegetation and associated insect abundance. This will help meet conservation targets for Daubenton's bats in line with the LBAP.

Impact	Mitigation type	Construction
		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). Freshwater habitats including detention basins and drainage channels, and woodland edge and hedgerow habitats, especially those within 1km of roosts, must be managed to increase prey diversity to maintain value as flight lines and foraging areas. Maintenance of existing habitat of value to bats to be retained and creation of new habitat to occur. Landscape planting must 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.
	Offset	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 (Highways Agency, 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 4 boxes per tree with roost potential to be replaced. Bat boxes must be located according to the following criteria in order to increase the likelihood of bats using them: Boxes must be sited at least 30m away from the proposed scheme to minimise the risk of attracting bats to the road. A mixture of box types must 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. - Boxes must 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 should 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. 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. More trees should 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 targets in Local and National BAPs for pipistrelles and Daubenton's bats. 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 3 years will be repositioned in alternative sites nearby.

Impact	Mitigation type	Construction
Habitat Fragmentation and Isolation	Prevent	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. 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. 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 must 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.
	Reduce	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 8.5 cm dimensions) non structural elements of bridges to provide roosting habitat. Where possible, woodland rides will be maintained and natural regeneration encouraged in gaps to offset isolation in the long term.
	Offset	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, where possible, new areas of woodland will adjoin existing blocks or act as stepping stones between neighbouring woods or connecting tree lines (Entwistle et al., 2001). 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 (Highways Agency, 2001). A crossing monitoring programme will be established to assess its success.
Disturbance	Prevent / Avoid	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. Trees to be retained will be safeguarded from damage according to BS 5837 (1991). 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. Bat roosts will not be directly illuminated and lighting will 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.

Impact	Mitigation type	Construction
	Reduce	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 Night working (between sunset and sunrise) will be avoided near to roosts to prevent alteration of bat emergence and social behaviour. 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.
	Offset	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). Natural screens will be provided along the scheme to offset disturbance caused by noise and vibration (see also the AWPR Environmental Statement 2007 Chapters 41: Landscape and 42: Visual).
Pollution	Prevent / Avoid	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 minimising the risk of pollution incidents near watercourses and water features. PPG 1 – General Guide to Prevention of Water Pollution; PPG 3 – Use and Design of Oil Separators; PPG 5 – works In, Near or Liable to Affect Watercourses; PPG 6 – Working at Construction and Demolition Sites; and PPG 21 – Pollution Incident Response Planning. Details regarding pollution control can be found in the Otter Report (Appendix A40.5) and Freshwater Ecology report (Appendix A40.9) of the AWPR Environmental Statement 2007. 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.
	Reduce	Levels of dust will be minimised so that this does not build up significantly on trees and scrub vegetation.

6.3 Specific Mitigation

6.3.1 Mitigation for bats is aimed at maintaining populations (particularly breeding and hibernating 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 the following means:

- prevention of direct mortality by the exclusion of bats from roosts that are to be destroyed. A licence must be obtained from the Scottish Executive Environment and Rural Affairs Department (SEERAD) in advance of development commencing. 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 which may be roosting in trees during construction.
- delineating a 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 this buffer zone, the size of which will be determined by the roost characteristics and situation.
- ensuring that trees to be retained are safeguarded from damage in accordance with the guidance provided in BSi (2005);
- designing, where possible, 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 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 on buildings, where appropriate, and in agreement with the landowner. Similarly, woodland areas lost as part of the scheme will be replaced at nearby suitable locations and existing areas of habitat enhanced.
- linear habitat planting alongside the scheme will be incorporated along bat flyways and within 50m of bat roosts to direct bats over the scheme, therefore preventing direct road mortality from occurring.
- night-time working will not be permitted in proximity to known roosts without agreement from SNH. Carriageway lighting will only be provided where necessary for road safety to minimise impact on bats.
- the use of Sustainable Urban Drainage Systems (SUDS) to manage pollution incidents.
- 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 removal of roosts or obstruction of access to any place used by bats for shelter, protection or breeding including within a dwelling house. The licensing system is provided by SEERAD but the advice of SNH will be sought prior to any such activities required, and their advice followed.

6.3.3 This advice will be sought in the form of the development of 'ghost licences', which will mirror the contents of the full licence. This approach will enable the development of a method and the full information required to ensure SNH are comfortable that the approach will fulfil the conservation regulations and maintain the favourable conservation status of the species concerned. Three tests must be granted before a licence may be granted and if any of these tests fail the licence application will be unsuccessful. It must be demonstrated that:

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

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 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.

Specific Mitigation – Section FL1

6.3.6 Specific areas of habitat creation in this section which will be of benefit to bats and which will offset the loss of valuable habitats include the provision of riparian habitat alongside the realigned Megray Burn (which will also maintain the existing commuting route along the burn), riparian woodland planting at Limpet Burn, and planting along the U88K road.

6.3.7 Woodcrete and wooden bat boxes will be provided in the valley at Megray Wood/Limpet Burn where the road passes close to potential roost trees.

6.3.8 The following crossing points will be provided for bats enabling safe crossings across the scheme:

- buried structure at Limpet Burn (ch1400) which will be enhanced by sensitive riparian woodland shaped around the entrances to encourage bat use;
- U89K underbridge through Megray Wood which will maintain a foraging and potential commuting route;
- U88K Underbridge at Fishermyre (ch2940) will be enhanced with linear planting to encourage bats to fly under the road.

6.3.9 The impacts of pollution and disturbance will be mitigated by generic mitigation measures including sensitive location of site access roads and compounds, no night works and best practice.

6.3.10 The specific mitigation proposals for Section FL1 are shown in Table 23 and Figures 40.5a-b.

Table 23 – Specific Mitigation Proposals Section FL1

Habitat Area	Impact Magnitude /Significance (Construction)	Mitigation Measures
F1 Agricultural fields between the A90 and Stonehaven	No significant direct impacts predicted (negligible/Negligible).	No mitigation required. Bats may benefit from mitigation measures to be provided in other Habitat Areas.
F2 Agricultural fields west of New Mains of Ury	No significant direct impacts predicted (negligible/Negligible).	No mitigation required. Bats may benefit from mitigation measures to be provided in other Habitat Areas.
F3 Agricultural fields north of Megray Farm	Direct mortality due to RTA (medium negative/Moderate). Habitat loss due to construction and operation (medium negative/Moderate). Severance due to construction (medium negative/Moderate). Severance due to operation (low negative/Minor) Disturbance due to construction and operation (low negative/Moderate). Pollution due to construction and operation (medium negative/Moderate).	Permanently severed commuting route will not be replaced. Habitat loss will be offset by mixed woodland and riparian planting to the east and west of the scheme and alongside the realigned Megray Burn. Realigned burn will be designed sensitively to retain features of interest to bats in the long term. Disturbance will be reduced by sensitive location of site access roads, compounds and plant during construction, with vibration and noise kept to a minimum within 50m of roost during breeding and hibernating period. Disturbance during operation will be reduced by minimisation and sensitive positioning of lighting at junction. Generic mitigation measures to prevent and reduce impacts associated with water quality/pollution during construction and operation including provision of detention basins.
F4 Woodland to the north west of Megray Farm	Habitat loss due to construction and operation (medium negative/Minor). Disturbance (low negative/Minor).	Loss of H-Ram Wood will be offset by mixed woodland and riparian planting to the east and west of the scheme and alongside the realigned Megray Burn. Realigned burn will be designed sensitively to retain features of interest to bats in the long term. Generic mitigation measures will reduce disturbance to foraging behaviour of bats.
F5 Fishermyre Wood	No significant direct impacts predicted (negligible/Negligible).	No mitigation required. Bats may benefit from mitigation measures to be provided in other Habitat Areas.
F6 Megray Wood	Habitat loss due to construction and operation (low negative/Minor). Disturbance due to construction and operation (medium negative/Minor).	No planting proposed to replace habitat lost. Generic mitigation measures will reduce disturbance to foraging bats. Mixed and riparian woodland planting either side of the bridge will encourage its use as a safe crossing by bats and reduce fragmentation and RTA risk during operation.
F7 Limpet Burn	Direct mortality due to construction (high negative/Moderate).	Generic mitigation to minimise risk of direct mortality during felling for construction including license application if bat roosts identified in pre-works surveys. Habitat loss due to construction will be reduced by limiting area of habitat clearance to the area necessary for works.. Habitat loss due to operation will be

Habitat Area	Impact Magnitude /Significance (Construction)	Mitigation Measures
	Habitat loss due to construction and operation (medium negative/Moderate). Severance of commuting route due to construction (medium negative/Moderate). Disturbance due to construction (medium negative/Moderate). Pollution of Limpet Burn due to construction and operation (medium negative/Moderate).	offset by riparian woodland planting on both sides of the scheme to extend the existing resource and direct foraging and commuting bats through the buried structure. Woodcrete and wooden bat boxes suitable for use by pipistrelle and Daubenton's bats will be provided in the trees to be retained in Megray Wood and along the valley sides to offset loss of potential roost trees. Disturbance of foraging and commuting bats and severance of commuting route will be reduced by keeping a flyway open during construction of the buried structure and no night works. Operational bridge will be high enough for bats to fly freely underneath and no lights will shine on the burn. Generic mitigation will minimise the risk of pollution of Limpet Burn during construction and operation
F8 Agricultural fields surrounding Coneyhatch and Wyndford Farm	No significant direct impacts predicted (negligible/Negligible).	No mitigation required. Bats may benefit from mitigation measures to be provided in other Habitat Areas.
F9 Kempstone Hill	No significant direct impacts predicted (negligible/Negligible).	No mitigation required. Bats may benefit from mitigation measures to be provided in other Habitat Areas.
F10 Fishermyre Wood South	Direct mortality due to RTA (high negative/Moderate) Habitat loss due to construction and operation (medium negative/Moderate). Fragmentation and severance due to construction and operation (medium negative/Moderate). Disturbance due to construction and operation (low negative/Minor). Pollution due to construction and operation (medium negative/Moderate).	RTA risk and severance of commuting route due to operation will be reduced by retention of the commuting route through provision of U88K Underbridge. U88K road to be planted with scrub to encourage bats to fly under the road. Crossing point to be monitored to ensure use by bats. The crossing will provide a safe place where bats can fly over the road, with no long term impacts on connectivity between habitats. Habitat loss during construction will be reduced by limiting area of habitat clearance to the area necessary for works. Habitat loss due to operation will be offset by provision of scattered wet woodland and broadleaved woodland in Fishermyre to tie in with existing vegetation on the east and west of the road. Generic mitigation will reduce disturbance including no night works during construction. Generic mitigation will minimise the risk of pollution during construction and operation.
F11 Fishermyre Wood North	No significant direct impacts predicted (negligible/Negligible).	No mitigation required. Bats may benefit from mitigation measures to be provided in other Habitat Areas.

Specific Mitigation Section FL2

6.3.11 Specific mitigation proposals in this section include linear planting of wet woodland vegetation along the U88K road and riparian planting at the Burn of Muchalls.

6.3.12 Woodcrete and wooden bat boxes will be provided in the trees to be retained along the Burn of Muchalls to offset the loss of potential roost trees.

6.3.13 Safe crossing points will be provided at the following locations:

- U88K Underbridge at Fishermyre (ch2940) will be enhanced with linear planting to encourage bats to fly under the road as per Section FL1;
- Buried Structure at the Burn of Muchalls (ch4700 and ch4725) with additional planting of riparian woodland along the access road to encourage bats to fly through
- C12K Overbridge at Clayfolds (ch5040) with planting of standard trees to encourage use by bats leaving the roost at Elrick.

6.3.14 In addition bats may benefit from the provision of culverts at Green Burn main and side roads. Detention basins to be provided at the Burn of Muchalls will be enhanced with riparian planting, and therefore may extend the foraging habitat resource in this area.

6.3.15 The impacts of pollution and disturbance will be mitigated by generic mitigation measures including sensitive location of site access roads and compounds, no night works and best practice.

6.3.16 Specific mitigation proposals in Section FL2 are shown in Table 24 and in Figures 40.5a-d.

Table 24 – Specific Mitigation Proposals Section FL2

Habitat Area	Impact Magnitude /Significance (Construction)	Mitigation Measures
F12 Fishermyre Wood and wet habitats to the south of Allochie Croft	Direct mortality due to RTA (high negative/Moderate) Habitat loss due to construction and operation (medium negative/Moderate). Fragmentation and severance due to construction and operation (medium negative/Moderate). Disturbance due to construction (medium negative/Moderate). Disturbance due to operation (low negative/Minor). Pollution of Green Burn (medium negative/Moderate).	RTA risk and severance of commuting route due to operation will be reduced by retention of the commuting route through provision of U88K Underbridge. U88K road to be planted with scrub to encourage bats to fly under the road. Crossing point to be monitored to ensure use by bats. The crossing will provide a safe place where bats can fly over the road, with no long term impacts on connectivity between habitats. Habitat loss due to construction will be reduced by limiting area of habitat clearance to the area necessary for works. Habitat loss due to operation will be offset by provision of scattered wet woodland and broadleaved woodland in Fishermyre to tie in with existing vegetation on the east and west of the road. Generic mitigation will reduce disturbance including no night works during construction. Generic mitigation will minimise the risk of pollution during construction and operation.
F13 Agricultural fields surrounding Hill of Muchalls	No significant direct impacts predicted (negligible/Negligible).	No mitigation required. Bats may benefit from mitigation measures to be provided in other Habitat Areas.
F14 Heath by Allochie	No significant direct impacts predicted (negligible/Negligible).	No mitigation required. Bats may benefit from mitigation measures to be provided in other Habitat Areas.
F15 Burn of Muchalls	Direct mortality due to construction (low negative/Minor). Habitat loss due to construction and operation (medium negative/Moderate). Fragmentation due to construction (medium negative/Moderate). Disturbance due to construction (medium negative/Moderate). Pollution due to construction and operation (medium negative/Moderate).	Generic mitigation to reduce direct mortality during felling for construction including license application if bat roosts identified in pre-works surveys. Habitat loss due to construction will be reduced by limiting area of habitat clearance to the area necessary for works. Habitat loss due to operation will be offset by riparian woodland planting along and adjacent to the Burn of Muchalls which will also extend the existing cover and shelter along the burn and provide foraging and roosting opportunities in the future. Woodcrete and wooden bat boxes suitable for use by pipistrelle and Daubenton's bats will be provided in the trees to be retained in Megray Wood and along the valley sides to offset loss of potential roost trees. Disturbance of foraging and commuting bats and severance of commuting route will be reduced by keeping a flyway open during construction of the buried structure and no night works. Operational bridge will be high enough for bats to fly freely underneath and no lights will shine on the burn. Generic mitigation including provision of detention basins will minimise the risk of pollution during construction and operation.
F16	Direct mortality due to RTA (high negative/Major).	RTA and severance will be reduced by enhancement of crossings to be provided at C12K Overbridge at Clayfolds and C25K Overbridge in Cookney. Standard tree planting at C12K Overbridge and standard and semi mature tree and mixed woodland planting at the C12K Overbridge in Cookney will enable bats emerging from roosts

Habitat Area	Impact Magnitude /Significance (Construction)	Mitigation Measures
Agricultural fields from north of the Burn of Muchalls to Cookney	Severance of commuting route due to construction and operation (medium negative/Moderate). Disturbance due to construction (medium negative/Moderate) Pollution due to construction and operation (low negative/Minor)	and commuting to foraging areas on the other side of the scheme to continue their journeys safely. Crossing points will be monitored during operation. Disturbance will be reduced by sensitive location of site access roads, compounds and plant during construction, with vibration and noise kept to a minimum within 50m of potential roosts. Disturbance of foraging and roosting bats will be reduced by limiting works to Risk of pollution will be minimised through generic mitigation measures.

Specific Mitigation – Section FL3

6.3.17 Few specific mitigation proposals are provided for bats in this Section due to the majority of the scheme passing through relatively low value farmland where few features are likely to be impacted. Specific mitigation proposals in addition to the generic measures above include habitat creation around Cookney. Bats would also benefit from the provision of linear habitat planting alongside the proposed scheme in the Stoneyhill area as per Chapter 41 (Landscape) of the of the AWPR Environmental Statement 2007, near Rothnick and in the Stranog area.

6.3.18 A heated bat box will be provided by landowner agreement in Cookney to provide an alternative roost in case the roost at North Cookney Croft becomes unsuitable for use as roost.

6.3.19 Crossing points suitable for use by bats will be provided at the following locations:

- C25K Overbridge in Cookney (ch6340) will be lined with semi mature trees and mixed woodland which will encourage use of a known pipistrelle commuting route
- C13K Overbridge in Rothnick (ch8540) will be lined with scrub woodland and hedges with trees to encourage use of this potential commuting route by bats
- C5K Underbridge at Stranog (ch10210) will maintain pipistrelle commuting route between Craigentath Wood and roosts and foraging on the other side.

6.3.20 In addition, there are eight burns in this section which will be culverted and may be of use as crossing points for bats. The provision of detention basins at the Burn of Elsick which will be enhanced with riparian planting, and at Cleanhill Junction will also increase the foraging potential of the area for bats.

6.3.21 The impacts of pollution and disturbance will be mitigated by the provision of temporary screens at North Cookney Croft and generic mitigation measures including sensitive location of site access roads and compounds, no night works and best practice.

6.3.22 The specific mitigation proposals for Section FL3 are shown in Table 25 and Figures 40.5d-f .

Table 25 – Specific Mitigation Proposals Section FL3

Habitat Area	Impact Magnitude /Significance (Construction)	Mitigation Measures
F17 Wet habitats north of Cookney	Habitat loss due to operation (low negative/Minor).	No specific mitigation required; bats will benefit from provision of safe commuting routes and habitat creation as per F16 and F18.
F18 Agricultural fields from Cookney to East Rothnick Wood	Direct mortality due to RTA (high negative/Major). Habitat loss due to construction (low negative/Minor). Habitat loss due to operation (high negative/Major). Severance due to construction and operation (medium negative/Moderate). Disturbance due to construction and operation (high negative/Major). Pollution due to construction and operation (Low negative/Minor).	RTA and severance will be reduced by enhancement of crossing to be provided at C25K Overbridge in Cookney as per F16. Semi mature tree and mixed woodland planting at the C12K Overbridge will enable bats emerging from roosts and commuting to foraging areas on the other side of the scheme to continue their journeys safely. Crossing points will be monitored during operation. Bats will benefit from provision of hedge and trees at the C13K Overbridge which may be used by commuting bats. A heated bat box will be provided by landowner agreement in Cookney to provide an alternative maternity roost site suitable for use by pipistrelle bats in the event that the roost at North Cookney Croft becomes unsuitable. Generic mitigation will reduce loss of habitat during construction; habitat creation as above and adjacent to scheme in this Habitat Area will reduce disturbance and provide some screening from the road. Disturbance of roosting bats at North Cookney Croft will be reduced by erection of a temporary screen between the road and the roost and minimisation of noise and vibration in the vicinity of the roost, including no night works and no artificial lighting near the roost. Risk of pollution will be minimised through generic mitigation measures including provision of detention basins.
F19 Stoneyhill	No significant direct impacts predicted (negligible/Negligible).	No mitigation required. Bats may benefit from mitigation measures to be provided in other Habitat Areas.
F20 Agricultural fields around Berrytop	No significant direct impacts predicted (negligible/Negligible).	No mitigation required. Bats may benefit from mitigation measures to be provided in other Habitat Areas.
F21 Wet habitats around East Crossley	No significant direct impacts predicted (negligible/Negligible).	No mitigation required. Bats may benefit from mitigation measures to be provided in other Habitat Areas.
F22 Agricultural fields from Quoscies to Stranog	Direct mortality due to RTA (high negative/Moderate). Severance of commuting route due to construction and operation (medium negative/Moderate). Disturbance due to construction and operation (low negative/Minor). Pollution die to construction and operation (low	Direct mortality and severance will be reduced by provision of features along which to commute during construction and provision of safe crossing point (C5K Underbridge) along existing commuting route through which bats can fly unimpeded during operation. Minimal planting and the provision of an edge habitat on the southern side of the road will provide some features which may help bats navigate through the bridge. Generic mitigation will reduce disturbance and risk of pollution.

Habitat Area	Impact Magnitude /Significance (Construction)	Mitigation Measures
	negative/Minor).	
F23 Dry heath/acid grassland mosaic to the west of Wedderhill.	No significant direct impacts predicted (negligible/Negligible).	No mitigation required. Bats may benefit from mitigation measures to be provided in other Habitat Areas.
F24 Bog/heath to the immediate west of Wedderhill.	No significant direct impacts predicted (negligible/Negligible).	No mitigation required. Bats may benefit from mitigation measures to be provided in other Habitat Areas.
F25 Plantation woodland south of Stranog	Disturbance due to construction and operation (low negative/Minor). Pollution due to construction and operation (low negative/Minor).	Disturbance and pollution will be reduced by provision of generic mitigation measures; bats will benefit from provision of mixed woodland planting in the woodland to reduce fragmentation.
F26 Agricultural fields to the south of Polston Farm	Direct mortality due to RTA (high negative/Moderate Habitat loss due to construction and operation (low negative/Minor). Severance due to construction and operation (medium negative/Moderate). Disturbance due to construction and operation (low negative/Minor). Pollution due to construction and operation (medium negative/Moderate).	Direct mortality and severance will be reduced by provision of features along which to commute during construction and provision of safe crossing point (C5K Underbridge) along existing commuting route through which bats can fly unimpeded during operation. Minimal planting and the provision of an edge habitat on the southern side of the road will provide some features which may help bats navigate through the bridge. Habitat loss will be reduced by limiting landtake for construction and operation and generic mitigation. Bats will benefit from habitat creation in other Habitat Areas (also refer to Part 1 of this report). Disturbance and pollution will be reduced by provision of generic mitigation measures including the provision of detention basins.
F27 Floodplain and immediate surrounds of Crynoch Burn	No significant direct impacts predicted (negligible/Negligible).	No mitigation required. Bats may benefit from mitigation measures to be provided in other Habitat Areas.

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 that 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 should 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 bat populations are unlikely to be compromised and in this respect potential impacts resulting from direct mortality are anticipated to be reduced 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 good quality replacement foraging, roosting or commuting opportunities immediately, although will do as 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 of low negative magnitude and Minor significance in the short to medium terms and of 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 these new landscape features. Research has suggested that bats will use these structures even if they are long and narrow (Bach and 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 have been assessed as being of low negative magnitude and Minor significance in the short term and negligible magnitude and 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 occur in the short term. 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. Provision of lighting at certain locations may be of benefit to foraging bats. The residual impacts of disturbance are therefore predicted to be of low negative magnitude and

Minor significance in the short term, and negligible magnitude and Negligible significance in the long term.

Pollution/Other Indirect Impacts

7.1.7 The implementation of measures to minimise the risk of 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 being of negligible magnitude and Negligible significance.

Specific Residual Impacts

7.1.8 There are a number of areas where residual impacts of low negative magnitude and Minor significance have been predicted due to the construction and operation of the scheme, where generic and specific mitigation measures are considered to result in residual impacts on the local bat populations. These are at Megray Burn and H-Ram Wood where loss of habitat and severance in the construction and operation phases will alter the landscape suitability for commuting and foraging bats; Megray Wood and Limpet Burn where habitat loss and disturbance are predicted to result in impacts; at Fishermyre Wood where habitat loss, fragmentation and disturbance to foraging and commuting bats are likely to persist; at the Burn of Muchalls where loss of riparian habitat is likely to remain an issue during construction; in Cookney where a roost is to be disturbed and potentially displaced due to construction and operation due to its proximity to the scheme; and at Altries Manse where habitat loss along field drains has not been mitigated for.

7.1.9 The residual impacts of the proposed scheme are shown below in Table 26 below.

Table 26 – Residual Impacts for the Fastlink

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
Section FL1					
F1	Construction / Operation	No impacts predicted due to retention of habitats.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
F2	Construction / Operation	No direct impacts predicted due to distance from scheme.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
F3	Construction	No direct mortality predicted due to absence of roosts on alignment.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
		Loss of Megray Burn and associated scrub, wet habitats and foraging/commuting potential due to burn realignment.	Medium Negative/Moderate	Despite provision of alternative riparian habitat and retention of commuting route during operation, short term loss of foraging/commuting habitat is likely until replacement habitat has matured.	Low negative/Minor
		Severance of burn and commuting routes will alter distribution of bats in locality.	Medium Negative/Moderate	Severed burn and commuting/foraging route will result in residual impacts if bats cannot travel through the area in the short term despite temporary provision for crossing.	Low Negative/Minor
		Disturbance of foraging and commuting pipistrelle bats likely due to burn realignment, and disturbance of roosting bats possible due to construction close to roosts at Mains of Ury.	Low Negative/Minor	Generic measures and provision of temporary screens will mitigate impacts on bats.	Negligible/Negligible
		Pollution of Megray Burn and associated reduction in invertebrate prey availability due to burn realignment.	Medium Negative/Moderate	Generic measures including provision of detention basins will mitigate impacts on bats.	Negligible/Negligible
	Operation	Direct mortality predicted due to RTA due to permanent severance of commuting route although alternative commuting routes exist.	Low Negative/Minor	Bats will find alternative commuting routes; some risk of RTA may remain.	Low negative/Minor
		Long term loss of foraging and commuting habitat predicted due to realignment of burn.	Medium Negative/Moderate	Provision of replacement habitat will offset habitat loss on maturity.	Negligible/Negligible
		Permanent severance of probable commuting route along Megray Farm Steading access track but alternative commuting routes exist at A90 junction and from Megray Wood. Commuting route along realigned Megray Burn will be retained.	Low Negative/Minor	Severed commuting route will not be replaced; may result in minor changes to bat commuting behaviour although alternative routes will be identified.	Low Negative/Minor
		Possible disturbance of roosting bats due to junction lighting.	Low Negative/Minor	Generic measures will mitigate impacts on bats.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
		Pollution of Megray Burn and associated reduction in invertebrate prey availability due to runoff from the scheme.	Medium Negative/Moderate	Generic measures including provision of detention basins will mitigate impacts on bats.	Negligible/Negligible
F4	Construction / Operation	No direct mortality predicted due to low roost potential of H-Ram Wood.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
		Loss of woodland and associated sheltered foraging habitat will reduce overall suitability of area to support pipistrelle bat population but alternative foraging resource exists.	Medium Negative/Minor	Loss of woodland will not be mitigated in the short term resulting in changes to bat foraging behaviour; in the long term realigned burn and riparian habitat provision will offset loss of woodland habitat.	Low Negative/Minor
		No fragmentation predicted due to loss of entire wood.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
		Disturbance likely to affect foraging behaviour of bats during construction and operation.	Medium Negative/Minor	Generic measures will mitigate impacts on bats.	Negligible/Negligible
		Pollution of Megray Burn assessed above for F3.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
F5	Construction / Operation	No direct impacts predicted due to distance from scheme.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
F6	Construction / Operation	No direct mortality predicted due to low roost potential of Megray Wood and retention of crossing point/flyway during operation.	Negligible/Negligible	Generic measures and provision of safe crossing for use by bats will mitigate impacts on bats.	Negligible/Negligible
		Loss of strip of conifer plantation woodland from eastern edge of Megray Wood will reduce suitability of foraging/edge habitat in the short term and proximity to road will reduce overall suitability for foraging.	Low Negative/Minor	No replacement habitat will be provided to offset loss of edge habitat although bats may benefit from wet woodland and riparian habitat planting alongside the road.	Low Negative/Minor
		No fragmentation predicted due to loss of habitat from extreme edge of woodland and retention of flyway along road through woodland.	Negligible/Negligible	Generic measures will mitigate impacts on bats and planting of riparian and mixed woodland habitat will encourage the use of the crossing by bats.	Negligible/Negligible
		Disturbance likely to affect foraging behaviour of bats during construction and operation.	Medium Negative/Minor	Generic measures will mitigate impacts on bats.	Low Negative/Minor
		No pollution of watercourses likely due to distance from proposed scheme.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
F7	Construction	Direct mortality possible if bats are roosting in trees to be felled.	High negative/Moderate	Generic measures including further survey, licence application and soft felling will mitigate impacts on bats.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
		Loss of wetland, scrub and sheltered foraging and commuting habitat along Limpet Burn due to construction of buried structure.	Medium Negative/Moderate	Limiting habitat loss to area of works and planting of alternative riparian habitat and bat box provision will partly reduce habitat loss.	Low Negative/Minor
		Severance of probable commuting route along Limpet Burn during construction of buried structure.	Medium Negative/Moderate	Commuting route will be retained during construction.	Negligible/Negligible
		Disturbance likely to affect foraging behaviour of bats during construction of buried structure.	Medium Negative/Moderate	As above - limiting habitat loss to area of works, planting of alternative riparian habitat and retention of commuting route during construction will partly reduce disturbance.	Low Negative/Minor
		Potential pollution of Limpet Burn and associated reduction in suitability of wetland habitats to support invertebrate prey for local pipistrelle and Daubenton's bat populations.	Medium Negative/Moderate	Generic measures will mitigate impacts on bats.	Negligible/Negligible
	Operation	No direct mortality predicted as buried structure will be high enough for bats to fly through.	Negligible/Negligible	Buried structure will be high enough for bats to fly underneath.	Negligible/Negligible
		Permanent loss of wetland and scrub habitats under buried structure and due to burn realignment.	Medium Negative/Moderate	Riparian woodland planting will offset loss of foraging habitat in the valley with no overall loss of foraging habitat; bat box provision will replace potential roost opportunities lost.	Negligible/Negligible
		No permanent severance of commuting route likely due to retention of flyway under the bridge; severance of potential commuting route along road through Megray Wood .	Negligible/Negligible	Buried structure will be high enough for bats to fly underneath.	Negligible/Negligible
		Bats unlikely to be disturbed during operation due to lack of lighting on the burn and valley.	Negligible/Negligible	Buried structure will be high enough for bats to fly underneath.	Negligible/Negligible
		Pollution of Limpet Burn and associated reduction in invertebrate prey availability due to runoff from the scheme.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
F8	Construction / Operation	No direct mortality predicted due to distance of potential roosts from proposed scheme.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
		No habitat loss predicted as proposed scheme passes through area of farmland with inherently low value to bats.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
		No habitat fragmentation or severance predicted due to low value of farmland habitat; adjacent commuting routes assessed as per F6, F7, F10 and F12.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
		No disturbance predicted due to absence of roosts on alignment and retention of adjacent features of value to foraging and commuting bats.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
		No pollution predicted during construction or operation due to absence of watercourses.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
F9	Construction / Operation	No direct impacts predicted due to distance from proposed scheme and lack of resources for bats.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
F10	Construction	No direct mortality predicted due to absence of roosts and low overall roosting value of features on alignment.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
		Temporary loss of high value woodland, scrub, heath and wet foraging habitat used by pipistrelle and Daubenton's bats.	Medium Negative/Moderate	Limiting habitat loss to area of works and planting of alternative riparian habitat will partly reduce habitat loss.	Low Negative/Minor
		Fragmentation of foraging area and severance of potential commuting route along road between Fishermyre and the Burn of Muchalls will isolate habitats either side of the scheme.	Medium Negative/Moderate	Temporary provision of commuting route during construction will retain connectivity between east and west of the scheme.	Low Negative/Minor
		No disturbance of roosting bats due to absence of roosts on alignment but disturbance during construction of embankment likely to affect foraging behaviour of bats.	Low Negative/Minor	Generic measures including no night works will mitigate impacts on bats.	Negligible/Negligible
		Potential pollution of Green Burn and wet habitats and alteration of hydrological regime and habitat suitability for foraging bats.	Medium Negative/Moderate	Generic measures will mitigate impacts on bats.	Negligible/Negligible
	Operation	Direct Mortality due to RTA possible if bats continue to use the road to commute between habitats either side of the proposed scheme.	High Negative/Moderate	Retention of commuting route along the U88K via underbridge which will be enhanced by planting to encourage its use by bats will reduce RTA risk by providing safe crossing.	Negligible/Negligible
		Permanent loss of woodland, scrub and wet habitats due to operation of road.	Medium Negative/Moderate	Habitat loss will be partly offset by woodland habitat creation on either side of the road in Fishermyre.	Low Negative/Minor
		Fragmentation of foraging area and severance of commuting route will reduce accessibility of habitat areas either side of the proposed scheme.	Medium Negative/Moderate	Retention of commuting route along the U88K via underbridge which will be enhanced by planting to encourage its use by bats will prevent severance by providing safe crossing.	Negligible/Negligible
		Reduced suitability of foraging area due to disturbance from traffic	Low Negative/Minor	Area likely to be less suitable for foraging due to traffic although bats may become accustomed to the disturbance.	Low negative/Minor
		Pollution of Green Burn and reduced suitability of foraging habitats due to runoff from scheme.	Medium Negative/Moderate	Generic measures will mitigate impacts on bats.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
F11	Construction / Operation	No direct impacts predicted due to distance from proposed scheme.	Negligible/ Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
Section FL2					
F12	Construction	No direct mortality predicted due to absence of roosts and low overall roosting value of features on alignment.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
		Temporary loss of high value woodland, scrub, heath and wet foraging habitat used by pipistrelle and Daubenton's bats.	Medium Negative/Moderate	Limiting habitat loss to area of works and planting of alternative riparian habitat will partly reduce habitat loss.	Low Negative/Minor
		Fragmentation of foraging area and severance of potential commuting route along road between Fishermyre and the Burn of Muchalls will isolate habitats either side of the scheme.	Medium Negative/Moderate	Temporary provision of commuting route during construction will retain connectivity between east and west of the scheme.	Low Negative/Minor
		No disturbance of roosting bats due to absence of roosts on alignment but disturbance during construction of embankment likely to affect foraging behaviour of bats	Low Negative/Minor	Generic measures including no night works will mitigate impacts on bats.	Negligible/Negligible
		Potential pollution of Green Burn and wet habitats and alteration of hydrological regime and habitat suitability for foraging bats	Medium Negative/Moderate	Generic measures will mitigate impacts on bats.	Negligible/Negligible
	Operation	Direct Mortality due to RTA possible if bats continue to use the road to commute between habitats either side of the proposed scheme.	High Negative/Moderate	Retention of commuting route along the U88K via underbridge which will be enhanced by planting to encourage its use by bats will reduce RTA risk by providing safe crossing.	Negligible/Negligible
		Permanent loss of woodland, scrub and wet habitats due to operation of road.	Medium Negative/Moderate	Habitat loss will be partly offset by woodland habitat creation on either side of the road in Fishermyre.	Low Negative/Minor
		Fragmentation of foraging area and severance of commuting route will reduce accessibility of habitat areas either side of the proposed scheme.	Medium Negative/Moderate	Retention of commuting route along the U88K via underbridge which will be enhanced by planting to encourage its use by bats will reduce RTA risk by providing safe crossing.	Negligible/Negligible
		Reduced suitability of foraging area due to disturbance from traffic.	Low Negative/Minor	Area likely to be less suitable for foraging due to traffic although bats may become accustomed to the disturbance.	Low negative/Minor
		Pollution of Green Burn and reduced suitability of foraging habitats due to runoff from scheme.	Medium Negative/Moderate	Generic measures will mitigate impacts on bats.	Negligible/Negligible
F13	Construction / Operation	No direct impacts predicted due to scheme passing through farmland of inherently low value to bats; potential impacts on commuting routes discussed as per F10, F12 and F15.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
F14	Construction / Operation	No direct impacts predicted due to distance from scheme.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
F15	Construction	Direct mortality possible if bats are roosting in trees to be felled alongside the Burn of Muchalls; few bats likely to be affected due to low overall potential for roosting bats.	Low Negative/Minor	Generic measures including further survey, licence application and soft felling will mitigate impacts on bats.	Negligible/Negligible
		Loss of riparian habitat and associated foraging opportunities and disruption to commuting route due to construction.	Medium Negative/Moderate	Limiting habitat loss to area of works and planting of alternative riparian habitat will partly reduce habitat loss.	Low Negative/Minor
		Fragmentation of linear habitat along the Burn of Muchalls and severance of bat commuting route.	Medium Negative/Moderate	Commuting route will be retained during construction.	Negligible/Negligible
		Temporary disturbance of foraging and commuting bats during construction of buried structure.	Medium Negative/Moderate	As above - limiting habitat loss to area of works, planting of alternative riparian habitat and retention of commuting route during construction will partly reduce disturbance.	Low Negative/Minor
		Potential pollution of the Burn of Muchalls due to construction.	Medium Negative/Moderate	Generic measures will mitigate impacts on bats.	Negligible/Negligible
	Operation	No direct mortality predicted as the buried structure will be high enough for bats to fly through unimpeded.	Negligible/Negligible	Buried structure will be high enough for bats to fly underneath.	Negligible/Negligible
		Permanent loss of small section of riparian woodland due to buried structure.	Low negative/Minor	Riparian woodland planting will offset loss of foraging habitat in the valley with no overall loss of foraging habitat; bat box provision will replace potential roost trees lost.	Negligible/Negligible
		No permanent fragmentation or severance of river corridor due to retention of flyway.	Negligible	Buried structure will be high enough for bats to fly underneath.	Negligible/Negligible
		No permanent disturbance predicted due to absence of lighting on the structure.	Negligible	Buried structure will be high enough for bats to fly underneath.	Negligible/Negligible
		Potential pollution of the Burn of Muchalls and downstream impacts on habitats and prey availability due to runoff from the road.	Medium Negative	Generic measures will mitigate impacts on bats.	Negligible/Negligible
F16	Construction	No direct mortality predicted due to the absence of roosts from the alignment.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
		Habitat loss of farmland of inherently low value to bats in unlikely to have significant impact on local bat populations.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
		Severance of commuting route along the road at Cookney will isolate habitats either side of the scheme including roosts in Cookney village and foraging habitats to the east, although alternative routes exist.	Medium Negative/Moderate	Commuting route will be retained during construction.	Negligible/Negligible
		Temporary disturbance of foraging and commuting bats likely during construction of cutting.	Medium Negative/Moderate	As above - limiting habitat loss to area of works, planting of alternative riparian habitat and retention of commuting route during construction will partly reduce disturbance.	Low Negative/Minor
		Potential pollution of the Burn of Blackbutts and foraging habitat downstream during construction.	Low Negative/Minor	Generic measures will mitigate impacts on bats.	Negligible/Negligible
	Operation	Direct mortality possible if bats continue to fly along the road at Cookney during operation.	High Negative/Major	Retention of commuting route along the C25K via Overbridge which will be enhanced by planting to encourage its use by bats will reduce RTA risk by providing safe crossing.	Negligible/Negligible
		Permanent loss of farmland habitat is unlikely to have a significant impact on the availability of foraging resources for bats.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
		Permanent severance and fragmentation of roosting and foraging habitats due to the severance of commuting routes to the east of Cookney.	Medium Negative/Moderate	Retention of commuting route along the C25K Overbridge which will be enhanced by planting to encourage its use by bats will prevent severance by providing safe crossing.	Negligible/Negligible
		No permanent disturbance of roosting or foraging bats likely due to the absence of resources along the alignment.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
		Potential pollution of the Burn of Blackbutts dur to runoff from the road.	Low negative/Minor	Generic measures will mitigate impacts on bats.	Negligible/Negligible
Section FL3					
F17	Construction / Operation	No direct mortality impacts predicted due to distance from scheme.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
		No direct loss of habitat predicted due to distance from scheme.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
		Indirect severance of roosting habitats in Cookney from foraging habitats along commuting route to the east of the scheme due to construction and operation of the road.	Medium Negative/Moderate	Provision of commuting route as per F16/F18 will mitigate for indirect severance.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
		No disturbance to roosting bats predicted due to distance from the proposed scheme.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
		No pollution predicted due to distance from the scheme and absence of watercourses in this Habitat Area.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
F18	Construction	No direct mortality predicted due to absence of roosts under the alignment.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
		Minimal loss of scrub and riparian foraging habitat at field boundaries, Balnagubs Burn and the Burn of Elsick.	Low Negative/Minor	Generic measures and habitat creation will mitigate impacts on bats.	Negligible/Negligible
		Severance of roosting habitats in Cookney from foraging habitats along commuting route to the east of the scheme due to construction and operation of the road as per F16/F17.	Medium Negative/Moderate	Commuting route will be retained during construction.	Negligible/Negligible
		Disturbance of roosting bats likely at North Cookney Croft if bats roosting during construction, especially during maternity roost season.	High Negative/Major	Limiting habitat loss to area of works, provision of temporary screen at roost and retention of commuting route during construction will partly reduce disturbance.	Low Negative/Minor
		Potential pollution of Balnagubs Burn and the Burn of Elsick due to risk of spills during construction.	Low Negative/Minor	Generic measures will mitigate impacts on bats.	Negligible/Negligible
	Operation	Direct Mortality possible due to RTA due to severance of commuting route and close proximity of roost (probable maternity roost) to the road.	High Negative/Major	Retention of commuting route along the C25K via Overbridge which will be enhanced by planting to encourage its use by bats will reduce RTA risk by providing safe crossing.	Negligible/Negligible
		Potential loss of roost at North Cookney Croft if roost characteristics change and displacement of probable maternity roost. Minimal loss of scrub and riparian foraging habitat at field boundaries, Balnagubs Burn and the Burn of Elsick.	High Negative/Major	Habitat creation and screening as per Landscape assessment will minimise impacts on roost which will not be directly impacted. Bats are expected to continue using the roost; further screening may be necessary if traffic causes disturbance at roost entrances; alternative roost provision elsewhere in Cookney (heated bat box) will provide alternative roost opportunities.	Low Negative/Minor
		Severance of commuting routes between roost and foraging habitats would lead to indirect loss of habitats either side of the road if bats cannot cross safely at Cookney; alternative routes exist north-south; potential impacts at the C13K at Rothnick if bats use the road to commute.	High Negative/Major	Retention of commuting route along the C25K Overbridge which will be enhanced by planting to encourage its use by bats will prevent severance by providing safe crossing.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
		Disturbance of emerging, roosting, commuting and foraging bats due to operation of the road at North Cookney Croft.	High Negative/Major	As above - landscape provision and screening, retention of commuting route and habitat creation will reduce disturbance of the roost.	Low Negative/Minor
		Potential pollution of Balnagubs Burn and the Burn of Elsick and downstream impacts on the foraging resource.	Low Negative/Minor	Generic measures will mitigate impacts on bats.	Negligible/Negligible
F19	Construction / Operation	No significant impacts on local bat populations predicted due to absence of features of value to bats on the alignment; indirect impacts addressed for adjacent habitats.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
F20	Construction / Operation	No significant impacts on local bat populations predicted due to absence of features of value to bats on the alignment; indirect impacts addressed for adjacent habitats.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
F21	Construction / Operation	No significant impacts on local bat populations predicted due to absence of features of value to bats on the alignment; indirect impacts addressed for adjacent habitats.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
F22	Construction	No direct mortality predicted due to absence of roosts on the alignment.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
		No significant loss of valuable bat habitat as scheme passes through low value farmland.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
		Scheme will sever commuting route and isolate roost at Altries Manse from foraging opportunities in Craigentath Wood, although alternative foraging resources exist on the same side of the scheme.	Medium Negative/Moderate	Commuting route at C5K will be retained during construction including provision of alternative features along which bats can commute.	Negligible/Negligible
		Reduced suitability of foraging area due to disturbance during construction.	Low Negative/Minor	Generic measures will mitigate impacts on bats.	Negligible/Negligible
		Potential pollution of burns during construction of scheme.	Low Negative/Minor	Generic measures will mitigate impacts on bats.	Negligible/Negligible
	Operation	Direct mortality due to RTA due to severance of commuting route.	High Negative/Moderate	Retention of commuting route along the C5K via underbridge through which bats will be able to fly unimpeded during operation; woodland edge will guide bats through structure. This will reduce RTA risk by providing safe crossing.	Negligible/Negligible
		No significant loss of habitat predicted due to scheme passing through low value farmland.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
		Scheme will sever commuting route and isolate roost at Altries Manse from foraging opportunities in Craigentath Wood, although alternative foraging resources exist on the same side of the scheme.	Medium Negative/Moderate	Retention of commuting route along the C5K via underbridge through which bats will be able to fly unimpeded during operation; woodland edge will guide bats through structure. This will provide safe crossing and maintain commuting route.	Negligible/Negligible
		Reduced suitability of foraging area due to disturbance from traffic.	Low Negative/Minor	Generic measures will mitigate impacts on bats.	Negligible/Negligible
		Potential pollution of burns during operation of scheme.	Low Negative/Minor	Generic measures will mitigate impacts on bats.	Negligible/Negligible
F23	Construction / Operation	No significant direct impacts predicted due to scheme running through low value farmland; indirect effects assessed for adjacent habitats.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
F24	Construction / Operation	No direct impacts predicted due to distance from scheme; indirect effects assessed for adjacent habitats.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
F25	Construction / Operation	No direct mortality predicted due to lack of roost potential in woodland.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
		Loss of low value conifer plantation woodland due to felling for construction.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
		Severance of commuting route assessed as for F22/F26.	n/a	Commuting route at C5K will be retained during construction including provision of alternative features along which bats can commute during construction and provision of underbridge through which bats will be able to fly unimpeded during operation.	Negligible/Negligible
		Reduced suitability of woodland edge habitat for foraging due to disturbance during construction and from traffic.	Low Negative/Minor	Generic measures will mitigate impacts on bats.	Negligible/Negligible
		Potential pollution of Square Burn and downstream impacts on Crynoch Burn and associated foraging habitats.	Low Negative/Minor	Generic measures will mitigate impacts on bats.	Negligible/Negligible
F26	Construction	No direct mortality predicted due to absence of roosts on alignment	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible
		Minimal temporary loss of foraging habitat along burns.	Low Negative/Minor	Generic measures will mitigate impacts on bats.	Negligible/Negligible

Habitat Area	Phase of Scheme	Impacts	Impact Magnitude/Significance	Residual Impacts	Mitigation Magnitude/Significance
		Severance of commuting route may isolate roost at Greens of Crynoch from foraging opportunities at Craigentath Wood, although alternative foraging resources exist on the same side (Crynoch Burn and Kingcausie).	Medium Negative/Moderate	Commuting route at C5K will be retained during construction including provision of alternative features along which bats can commute.	Negligible/Negligible
		Disturbance of foraging and commuting pipistrelle bats likely due to construction.	Low Negative/Minor	Generic measures will mitigate impacts on bats.	Negligible/Negligible
		Potential pollution of burns and field ditches due to construction with potential downstream impacts on foraging resource at Crynoch Burn.	Medium Negative/Moderate	Generic measures will mitigate impacts on bats.	Negligible/Negligible
	Operation	Direct Mortality due to RTA along a commuting route between a roost and foraging area.	High negative/Moderate	Retention of commuting route along the C5K via underbridge through which bats will be able to fly unimpeded during operation; woodland edge will guide bats through structure. This will provide safe crossing point and reduce risk of RTA.	Negligible/Negligible
		Minimal permanent loss of foraging habitat along burns due to operational scheme.	Low Negative/Minor	No specific habitat replacement will be undertaken although bats may benefit from provision in other habitat areas.	Low Negative/Minor
		Permanent severance of pipistrelle bat commuting route along road and effective isolation of foraging and roosting habitats.	Medium Negative/Moderate	Retention of commuting route along the C5K via underbridge through which bats will be able to fly unimpeded during operation; woodland edge will guide bats through structure. This will provide safe crossing and maintain commuting route.	Negligible/Negligible
		Operational scheme may result in disturbance of foraging and commuting behaviour.	Low Negative/Minor	Generic measures will reduce impacts on bats.	Negligible/Negligible
		Potential pollution of burns and field ditches due to operation with potential downstream impacts on foraging resources at Crynoch Burn.	Medium Negative/Moderate	Generic measures including provision of detention basins will mitigate impacts on bats.	Negligible/Negligible
F27	Construction / Operation	No direct impacts predicted due to distance from the scheme; indirect impacts on foraging resource availability at Crynoch Burn have been assessed above.	Negligible/Negligible	Generic measures will mitigate impacts on bats.	Negligible/Negligible

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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

EcIA – 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

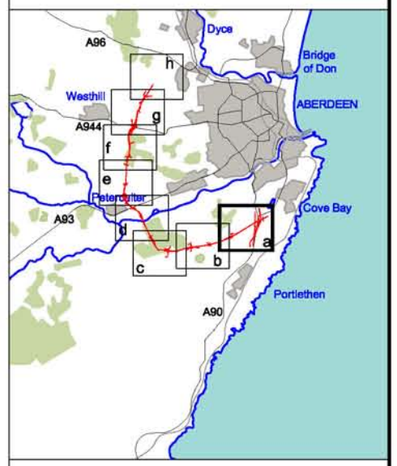
Torpor – physiological state which bats use to conserve energy during the day and during poor weather conditions

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.

APPENDIX 1

FIGURES

FIGURE 25.4a



NORTH

EDGE OF GREENHOWE WOOD

CHARLESTON JUNCTION

LOIRSTON LOCH

CHARLESTON

GREENHOWE WOODS

GREENHOWE POND

THE CROSSROADS

LOIRSTON BURN

GREENGATE DITCH

WELLINGTON LOCH

HARE MOSS

DUFF'S HILL

CAUSEY MOUNTH

BISHOPSTON DITCH (HARE MOSS)

Continued on Sheet 2 of 8 (Figure 25.4b)

0 1km 2km

LEGEND

- Proposed Route (Engineering Profile 04/05/07)
- Indicative Study Area (500m from centre of Proposed Route)
- Woodland
- Watercourses and Waterbody

Building Roosts / Individual & Multiple Tree Roosts

- Direct Evidence of Current Use by Bats (1A)
- Evidence of Recent Use by Bats (1B)
- Roost Identified by Aberdeen Bat Group
- Emergence Survey Done (Roost Confirmed)

Bat Activity

- Foraging (numeric value for number of passes)
- Foraging (number of passes exceeding 30)
- Foraging (number of passes exceeding 100)
- Pipistrelle Bat
- Natterer's Bat
- Daubenton's Bat
- Brown Long-eared Bat
- Potential Leisler's Bat Sighting

Commuting Routes

- Actual / Potential
- BURNHEAD — Commuting Route Reference Label

Survey Route

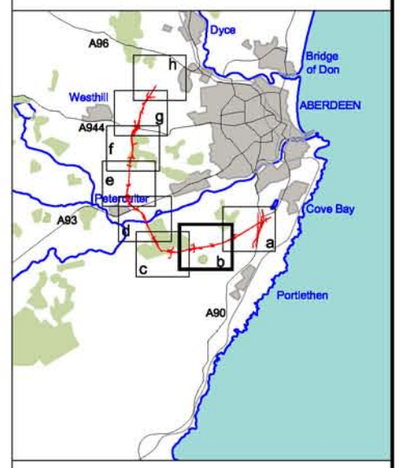
- 2006 / 2004

Rev	Date	Purpose of Revision	Drwn	Chkd	Appd

JACOBS
95 Bothwell Street, Glasgow, G2 7HX, UK
Tel: 0141 204 2511 Fax: 0141 226 3109
www.jacobsbabtie.com

Client	Aberdeen Western Peripheral Route
Project	Aberdeen Western Peripheral Route Environmental Statement 2007 Additional Survey Report : Bats
Title	Bat Activity Surveys Sheet 1 of 8
Drawing Status	FINAL
JB No.	0010332
Figure No.	FIGURE 25.4a
Revisions	
Scale	1:10,000
Date	Oct 2007
Drawn	SHF
Checked	PG
Approved	SH

FIGURE 25.4b



NORTH

Continued on Sheet 3 of 8 (Figure 25.4c)

Continued on Sheet 1 of 8 (Figure 25.4a)

AUCHLUNIES

SHANNA BURN

EASTERN ROAD NORTH OF CLOCHANDIGHTER

Ecological Section SL 2

Ecological Section SL 1

BURN OF ARDOE

JAMESTON DITCH (HARE MOSS)

HARE MOSS

COWFORD BURN

COWFORD POND

HEATHFIELD BURN

BURN OF ARDOE

204000

BISHOPSTON DITCH (HARE MOSS)

BISHOPSTON

MERCHANT'S CROFT

WESTERN ROAD NORTH OF CLOCHANDIGHTER

CLOCHANDIGHTER

CLOCHANDIGHTER RESERVOIR

MERCHANT'S CROFT

BURNHEAD BURN

BARNHILL BURN

BISHOPSTON

Bodantoy Park Industrial Estate

0 1km 2km

LEGEND

- Proposed Route (Engineering Profile 04/05/07)
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- Woodland
- Watercourses and Waterbody

Building Roosts / Individual & Multiple Tree Roosts

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Title	Bat Activity Surveys Sheet 2 of 8
Drawing Status	FINAL
JB No.	0010332
Figure No.	FIGURE 25.4b
Revisions	
Scale	1:10,000
Date	Oct 2007
Drawn	SHF
Checked	PG
Approved	SH

FIGURE 25.4c

NORTH

Continued on Sheet 4 of 8 (Figure 25.4d)

Ecological Section SL 3

Ecological Section SL 2

Ecological Section SL 3

Ecological Section FL 3

BLAIKIEWELL BURN

BLAIKIEWELL BURN

DURRIS BURN

CLEANHILL JUNCTION

BLAIKIEWELL

BURNHEAD

BURNHEAD

BURNHEAD BURN

WHITESTONE BURN

MERCHANT'S CROFT

BURNHEAD BURN

BARNHILL BURN

SWELLHEAD BURN

WOODBURN

CRAIGENTATH DITCH

WEDDERHILL BURN

GREENS OF CRYNOCH BURN

CRAIGENTATH BURN

BETWEEN STRANOG CROSSROADS AND CRAIGTATH FARM (GREENS OF CRYNOCH)

SQUARE BURN

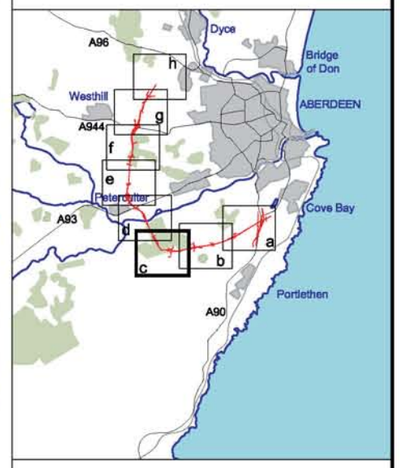
STRANOG BURN

Continued on Sheet 2 of 8 (Figure 25.4b)

Start of Southern Leg (Part C)

Start of Fastlink (Part D)

0 1km 2km



LEGEND

- Proposed Route (Engineering Profile 04/05/07)
- Indicative Study Area (500m from centre of Proposed Route)
- Woodland
- Watercourses and Waterbody

Building Roosts / Individual & Multiple Tree Roosts

- Direct Evidence of Current Use by Bats (1A)
- Evidence of Recent Use by Bats (1B)
- Roost Identified by Aberdeen Bat Group
- Emergence Survey Done (Roost Confirmed)

Bat Activity

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- Foraging (number of passes exceeding 100)
- Pipistrelle Bat
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Project	Aberdeen Western Peripheral Route Environmental Statement 2007 Additional Survey Report : Bats
Title	Bat Activity Surveys Sheet 3 of 8
Drawing Status	FINAL
JB No.	0010332
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Date	Oct 2007
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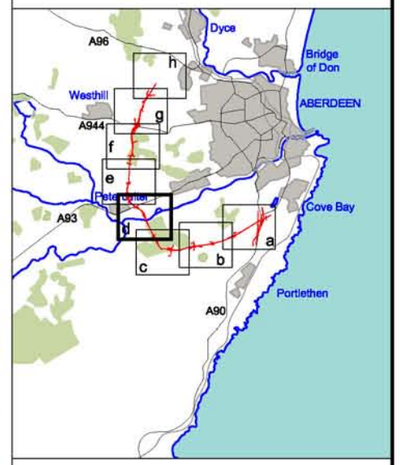
Checked	PG
Approved	SH

FIGURE 25.4d



NORTH

CULTER HOUSE ROAD AND ACCESS ROAD

Continued on Sheet 5 of 8 (Figure 25.4e)

NORTH DEESIDE ROAD

Ecological Section SL 4

Ecological Section SL 3

MILLTIMBER

OLD DEESIDE LINE

MILLTIMBER BURN

PETERCULTER

CAMPHILL

RIVER DEE

ROAD TO MILLTIMBER

SOUTH DEESIDE ROAD

MILL BANK BURN

CRYNOCH MILL LADE

CRYNOCH BURN

KINGCAUSIE

Continued on Sheet 3 of 8 (Figure 25.4c)

0 1km 2km

LEGEND

- Proposed Route (Engineering Profile 04/05/07)
- Indicative Study Area (500m from centre of Proposed Route)
- Woodland
- Watercourses and Waterbody

Building Roosts / Individual & Multiple Tree Roosts

- Direct Evidence of Current Use by Bats (1A)
- Evidence of Recent Use by Bats (1B)
- Roost Identified by Aberdeen Bat Group
- Emergence Survey Done (Roost Confirmed)

Bat Activity

- Foraging (numeric value for number of passes)
- Foraging (number of passes exceeding 30)
- Foraging (number of passes exceeding 100)
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Commuting Routes

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Survey Route

- 2006 / 2004

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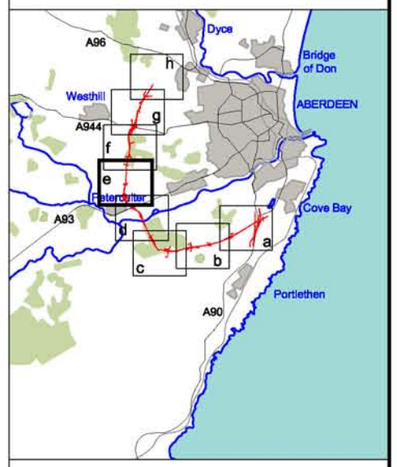
Project	Aberdeen Western Peripheral Route Environmental Statement 2007 Additional Survey Report : Bats
Title	Bat Activity Surveys Sheet 4 of 8
Drawing Status	FINAL
JB No.	0010332
Figure No.	FIGURE 25.4d
Revisions	
Scale	1:10,000
Date	Oct 2007
Drawn	SHF
Checked	PG
Approved	SH

FIGURE 25.4e



NORTH

Continued on Sheet 6 of 8 (Figure 25.4f)

ORD BURN

UPPER BEANSHILL BURN

BEANSHILL PONDS

Ecological Section SL 5

Ecological Section SL 4

BEANS HILL

TRACK BETWEEN BEANSHILL AND CONTLAW ROAD

BEANS BURN

MURTLE DEN BURN

CONTLAW ROAD

AIRY PARK COTTAGE

HILL OF MILLTIMBER

MILLTIMBER JUNCTION

BUCKLER BURN

A93 MILLTIMBER JUNCTION

BELLENDEN BURN

TRIB OF MILLTIMBER

ARDBECK BURN

CULTER HOUSE ROAD AND ACCESS ROAD

CULTER HOUSE BURN

Continued on Sheet 4 of 8 (Figure 25.4d)

NORTH DEESIDE ROAD

MILLTIMBER

Ecological Section SL

0 1km 2km

LEGEND

- Proposed Route (Engineering Profile 04/05/07)
- Indicative Study Area (500m from centre of Proposed Route)
- Woodland
- Watercourses and Waterbody

Building Roosts / Individual & Multiple Tree Roosts

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- Evidence of Recent Use by Bats (1B)
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Bat Activity

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- Pipistrelle Bat
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- Daubenton's Bat
- Brown Long-eared Bat
- Potential Leisler's Bat Sighting

Commuting Routes

- Actual / Potential
- BURNHEAD — Commuting Route Reference Label

Survey Route

- 2006 / 2004

Rev	Date	Purpose of Revision	Drwn	Chkd	Appd

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Client	Aberdeen Western Peripheral Route
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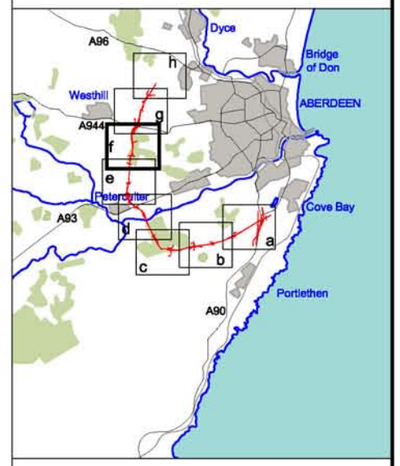
Title	Bat Activity Surveys Sheet 5 of 8
Drawing Status	FINAL
JB No.	0010332
Figure No.	FIGURE 25.4e
Revisions	
Scale	1:10,000
Date	Oct 2007
Drawn	SHF
Checked	PG
Approved	SH

FIGURE 25.4f



NORTH

A 944

DEN BURN

Continued on Sheet 7 of 8 (Figure 25.4g)

Ecological Section SL 6

Ecological Section SL 5

SMIDDYBRAE

ACCESS TO AUCHLEA MOSS

AUCHLEA

MOSS OF AUCHLEA

SILVERBURN

MOSS OF AUCHLEA DRAINAGE SYSTEM

GAIRNHILL FARM TRACK

EDGE OF GAIRNHILL WOOD

GAIRNHILL FARM ACCESS

SILVER BURN

GAIRN BURN

SILVERBURN

SILVERBURN ROAD

TRIB OF ORD BURN

ORD BURN

ORD BURN

UPPER BEANSHILL BURN

BEANSHILL PONDS

Ecological Section SL 5

Ecological Section SL 4

Continued on Sheet 5 of 8 (Figure 25.4e)

10800N

107000

106000

0 1km 2km

LEGEND

- Proposed Route (Engineering Profile 04/05/07)
- Indicative Study Area (500m from centre of Proposed Route)
- Woodland
- Watercourses and Waterbody

Building Roosts / Individual & Multiple Tree Roosts

- Direct Evidence of Current Use by Bats (1A)
- Evidence of Recent Use by Bats (1B)
- Roost Identified by Aberdeen Bat Group
- Emergence Survey Done (Roost Confirmed)

Bat Activity

- Foraging (numeric value for number of passes)
- Foraging (number of passes exceeding 30)
- Foraging (number of passes exceeding 100)
- Pipistrelle Bat
- Natterer's Bat
- Daubenton's Bat
- Brown Long-eared Bat
- Potential Leisler's Bat Sighting

Commuting Routes

- Actual / Potential
- BURNHEAD Commuting Route Reference Label

Survey Route

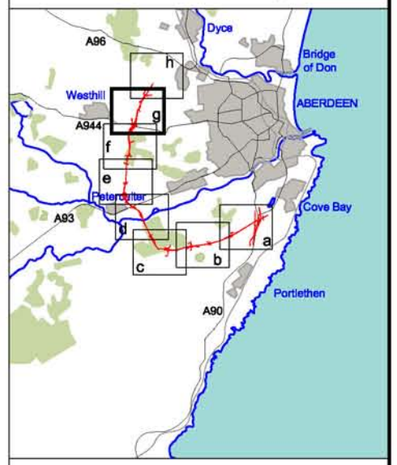
- 2006 / 2004

Rev	Date	Purpose of Revision	Drwn	Chkd	Appd

JACOBS
95 Bothwell Street, Glasgow, G2 7HX, UK
Tel: 0141 204 2511 Fax: 0141 226 3109
www.jacobsbabtie.com

Client	Aberdeen Western Peripheral Route
Project	Aberdeen Western Peripheral Route Environmental Statement 2007 Additional Survey Report : Bats
Title	Bat Activity Surveys Sheet 6 of 8
Drawing Status	FINAL
JB No.	0010332
Figure No.	FIGURE 25.4f
Revisions	
Scale	1:10,000
Date	Oct 2007
Drawn	SHF
Checked	PG
Approved	SH

FIGURE 25.4g



Continued on Sheet 8 of 8 (Figure 25.4h)

Continued on Sheet 6 of 8 (Figure 25.4f)

NORTH

FAIRLEY HOME FARM

BORROWSTONE POND

BORROWSTONE BURN

BUCK'S BURN

CLOGHILL

KINGSWELL

KINGSWELLS

WEST HATTON

BRODIACH BURN

WESTHOLME BURN

SOUTH KINGSWELLS JUNCTION

DEN BURN

SMIDDYBRAE

Ecological Section SL 6

Ecological Section SL 5

111000

110000

109000

108000

0 1km 2km

LEGEND

- Proposed Route (Engineering Profile 04/05/07)
- Indicative Study Area (500m from centre of Proposed Route)
- Woodland
- Watercourses and Waterbody

Building Roosts / Individual & Multiple Tree Roosts

- Direct Evidence of Current Use by Bats (1A)
- Evidence of Recent Use by Bats (1B)
- Roost Identified by Aberdeen Bat Group
- Emergence Survey Done (Roost Confirmed)

Bat Activity

- Foraging (numeric value for number of passes)
- Foraging (number of passes exceeding 30)
- Foraging (number of passes exceeding 100)
- Pipistrelle Bat
- Natterer's Bat
- Daubenton's Bat
- Brown Long-eared Bat
- Potential Leisler's Bat Sighting

Commuting Routes

- Actual / Potential
- BURNHEAD — Commuting Route Reference Label

Survey Route

- 2006 / 2004

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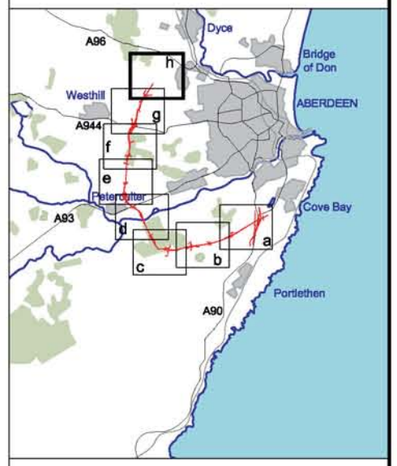
Title	Bat Activity Surveys Sheet 7 of 8
Drawing Status	FINAL
JB No.	0010332
Figure No.	FIGURE 25.4g
Revisions	
Scale	1:10,000
Date	Oct 2007
Drawn	SHF
Checked	PG
Approved	SH

FIGURE 25.4h



NORTH

BRIMMOND HILL

Brimmond Country Park

KEPPELHILL BURN

111000

FAIRLEY HOME FARM

BORROWSTONE POND

Start of Northern Leg (Part B)

Start of Southern Leg (Part C)

Continued on Sheet 7 of 8 (Figure 25.4g)

0 1km 2km

LEGEND

- Proposed Route (Engineering Profile 04/05/07)
- Indicative Study Area (500m from centre of Proposed Route)
- Woodland
- Watercourses and Waterbody

Building Roosts / Individual & Multiple Tree Roosts

- Direct Evidence of Current Use by Bats (1A)
- Evidence of Recent Use by Bats (1B)
- Roost Identified by Aberdeen Bat Group
- Emergence Survey Done (Roost Confirmed)

Bat Activity

- Foraging (numeric value for number of passes)
- Foraging (number of passes exceeding 30)
- Foraging (number of passes exceeding 100)
- Pipistrelle Bat
- Natterer's Bat
- Daubenton's Bat
- Brown Long-eared Bat
- Potential Leisler's Bat Sighting

Commuting Routes

- Actual / Potential
- BURNHEAD — Commuting Route Reference Label

Survey Route

- 2006 / 2004

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Project	Aberdeen Western Peripheral Route Environmental Statement 2007 Additional Survey Report : Bats
Title	Bat Activity Surveys Sheet 8 of 8
Drawing Status	FINAL
JB No.	0010332
Figure No.	FIGURE 25.4h
Revisions	
Scale	1:10,000
Date	Oct 2007
Drawn	SHF
Checked	PG
Approved	SH

NORTH

THE CROSSROADS

GREENHOWE WOODS

GREENHOWE POND

CHARLESTON JUNCTION

CHARLESTON

LOIRSTON LOCH

LOIRSTON BURN

GREENGATE DITCH

WELLINGTON LOCH

HARE MOSS

DUFF'S HILL

BISHOPSTON DITCH (HARE MOSS)

Continued on Sheet 2 of 8 (Figure 25.5b)

207000

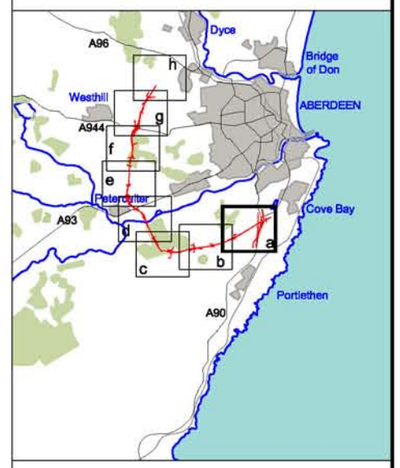
206000

205000

204000

0 1km 2km

FIGURE 25.5a



LEGEND

- Proposed Route (Engineering Profile 04/05/07)
- Indicative Study Area (500m from centre of Proposed Route)
- Woodland
- Watercourses and Waterbody

Building Roosts

- Bat Roost (1A)
- Bat Roost (1B)
- Potential Bat Roost (2A)
- Potential Bat Roost (2B)
- No Potential as a Bat Roost (3)
- Roost Identified by Aberdeen Bat Group
- Emergence Survey Done (Roost Not Confirmed)
- Emergence Survey Done (Roost Confirmed)

Individual & Multiple Tree Roosts

- Bat Roost (1A)
- Bat Roost (1B)
- Potential Bat Roost (2A)
- Potential Bat Roost (2B)

Habitat Assessment

- High & Medium Potential (roosting, foraging, commuting - see report)

Bridges / Culverts Roost Potential

- H M L High, Medium & Low

Rev	Date	Purpose of Revision	Drwn	Chkd	Appd

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Project	Aberdeen Western Peripheral Route Environmental Statement 2007 Additional Survey Report : Bats
Title	Bat Habitat Surveys Sheet 1 of 8
Drawing Status	FINAL
JB No.	0010332
Figure No.	FIGURE 25.5a
Revisions	
Scale	1:10,000
Date	Oct 2007
Drawn	SHF
Checked	PG
Approved	SH

FIGURE 25.5b

NORTH

AUCHLUNIES

SHANNA BURN

Ecological Section SL 2

Ecological Section SL 1

BURN OF ARDOE

JAMESTON DITCH (HARE MOSS)

COWFORD BURN

COWFORD POND

HARE MOSS

HEATHFIELD BURN

BURN OF ARDOE

POND AT HILL OF BLAIRS

BISHOPSTON

BISHOPSTON DITCH (HARE MOSS)

MERCHANT'S CROFT

CLOCHANDIGHTER

CLOCHANDIGHTER RESERVOIR

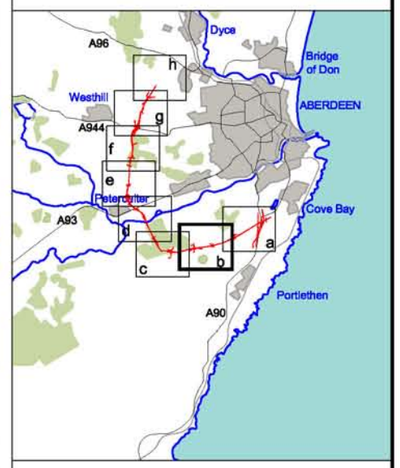
BURNHEAD BURN

BARNHILL BURN

Bodentoy Park Industrial Estate

Continued on Sheet 1 of 8 (Figure 25.5a)

Continued on Sheet 3 of 8 (Figure 25.5c)



LEGEND

- Proposed Route (Engineering Profile 04/05/07)
- Indicative Study Area (500m from centre of Proposed Route)
- Woodland
- Watercourses and Waterbody

Building Roosts

- Bat Roost (1A)
- Bat Roost (1B)
- Potential Bat Roost (2A)
- Potential Bat Roost (2B)
- No Potential as a Bat Roost (3)
- Roost Identified by Aberdeen Bat Group (BG)
- Emergence Survey Done (Roost Not Confirmed)
- Emergence Survey Done (Roost Confirmed)

Individual & Multiple Tree Roosts

- Bat Roost (1A)
- Bat Roost (1B)
- Potential Bat Roost (2A)
- Potential Bat Roost (2B)

Habitat Assessment

- High & Medium Potential (roosting, foraging, commuting - see report)

Bridges / Culverts Roost Potential

- H M L — High, Medium & Low

Rev	Date	Purpose of Revision	Drwn	Chkd	Appd

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Client	Aberdeen Western Peripheral Route
Project	Aberdeen Western Peripheral Route Environmental Statement 2007 Additional Survey Report : Bats
Title	Bat Habitat Surveys Sheet 2 of 8
Drawing Status	FINAL
JB No.	0010332
Figure No.	FIGURE 25.5b
Revisions	
Scale	1:10,000
Date	Oct 2007
Drawn	SHF
Checked	PG
Approved	SH

0 1km 2km

FIGURE 25.5c

NORTH

Continued on Sheet 4 of 8 (Figure 25.5d)

Continued on Sheet 2 of 8 (Figure 25.5b)

Ecological Section SL 3

Ecological Section SL 2

Ecological Section FL 3

KINGCAUSIE POND

KINGCAUSIE BURN

GLENBURNIE & OLDLINE PONDS

POND AT HILL OF BLAIRS

BLAIKIEWELL BURN

CRYNDEL BURN

CLEANHILL JUNCTION

BLAIKIEWELL

BURNHEAD

WHITESTONE BURN

BURNHEAD BURN

BARNHILL BURN

SWELLHEAD BURN

DURRIS BURN

WOODBURN

CRAIGENTATH DITCH

WEDDERHILL BURN

GREENS OF CRYNOCH BURN

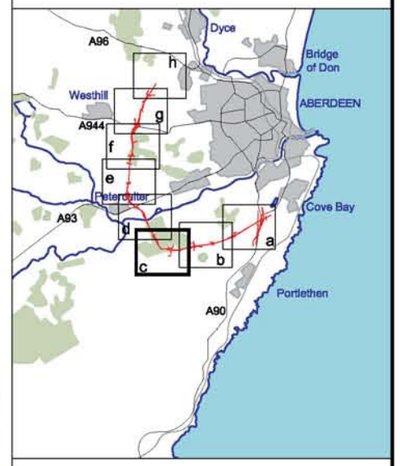
CRAIGENTATH BURN

STRANOG BURN

SQUARE BURN

Start of Southern Leg (Part C)

Start of Fastlink (Part D)



LEGEND

- Proposed Route (Engineering Profile 04/05/07)
- Indicative Study Area (500m from centre of Proposed Route)
- Woodland
- Watercourses and Waterbody

Building Roosts

- Bat Roost (1A)
- Bat Roost (1B)
- Potential Bat Roost (2A)
- Potential Bat Roost (2B)
- No Potential as a Bat Roost (3)
- Roost Identified by Aberdeen Bat Group
- Emergence Survey Done (Roost Not Confirmed)
- Emergence Survey Done (Roost Confirmed)

Individual & Multiple Tree Roosts

- Bat Roost (1A)
- Bat Roost (1B)
- Potential Bat Roost (2A)
- Potential Bat Roost (2B)

Habitat Assessment

- High & Medium Potential (roosting, foraging, commuting - see report)

Bridges / Culverts Roost Potential

- H M L — High, Medium & Low

Rev	Date	Purpose of Revision	Drwn	Chkd	Appd

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Project	Aberdeen Western Peripheral Route Environmental Statement 2007 Additional Survey Report : Bats
Title	Bat Habitat Surveys Sheet 3 of 8
Drawing Status	FINAL
JB No.	0010332
Figure No.	FIGURE 25.5c
Revisions	
Scale	1:10,000
Date	Oct 2007
Drawn	SHF
Checked	PG
Approved	SH

0 1km 2km

FIGURE 25.5d

NORTH

Continued on Sheet 5 of 8 (Figure 25.5e)

Continued on Sheet 3 of 8 (Figure 25.5c)

Ecological Section SL 4

Ecological Section SL 3

MILLTIMBER

PETERCULTER

CAMPHILL

KINGCAUSIE

CULTER HOUSE BURN

TRIB OF MILLTIMBER

MILLTIMBER BURN

ALBURN BURN

RIVER DEE

MILL BANK BURN

CRYNOCH MILL LADE

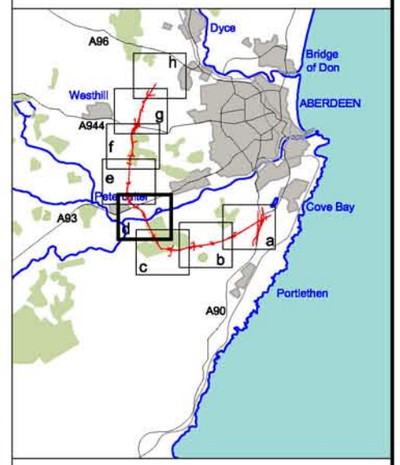
CRYNOCH BURN

KINGCAUSIE POND

KINGCAUSIE BURN

GLENBURNIE & ONLINE PONDS

102000



LEGEND

- Proposed Route (Engineering Profile 04/05/07)
- Indicative Study Area (500m from centre of Proposed Route)
- Woodland
- Watercourses and Waterbody

Building Roosts

- Bat Roost (1A)
- Bat Roost (1B)
- Potential Bat Roost (2A)
- Potential Bat Roost (2B)
- No Potential as a Bat Roost (3)
- Roost Identified by Aberdeen Bat Group
- Emergence Survey Done (Roost Not Confirmed)
- Emergence Survey Done (Roost Confirmed)

Individual & Multiple Tree Roosts

- Bat Roost (1A)
- Bat Roost (1B)
- Potential Bat Roost (2A)
- Potential Bat Roost (2B)

Habitat Assessment

- High & Medium Potential (roosting, foraging, commuting - see report)

Bridges / Culverts Roost Potential

- H M L High, Medium & Low

Rev	Date	Purpose of Revision	Drwn	Chkd	Appd

JACOBS
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Client	Aberdeen Western Peripheral Route
Project	Aberdeen Western Peripheral Route Environmental Statement 2007 Additional Survey Report : Bats
Title	Bat Habitat Surveys Sheet 4 of 8
Drawing Status	FINAL
JB No.	0010332
Figure No.	FIGURE 25.5d
Revisions	
Scale	1:10,000
Date	Oct 2007
Drawn	SHF
Checked	PG
Approved	SH

0 1km 2km

FIGURE 25.5e

NORTH

ORD BURN

UPPER BEANSHILL BURN

Continued on Sheet 6 of 8 (Figure 25.5f)

Ecological Section SL 5

Ecological Section SL 4

BEANSHILL PONDS

BEANS HILL

BEANS BURN

MURTLE DEN BURN

105000

HILL OF MILLTIMBER

BUCKLER BURN

ARDBECK BURN

A93 MILLTIMBER JUNCTION

CULTER HOUSE BURN

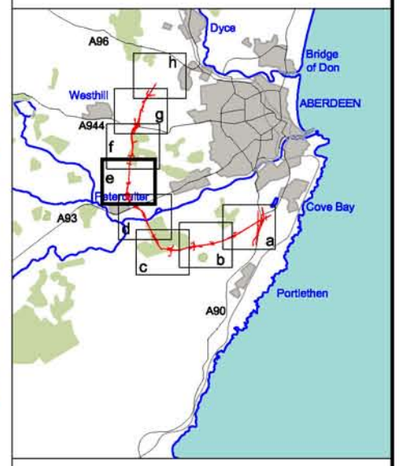
BELLENDEN BURN

TRIB OF MILLTIMBER

Continued on Sheet 4 of 8 (Figure 25.5d)

MILLTIMBER

0 1km 2km



LEGEND

- Proposed Route (Engineering Profile 04/05/07)
- Indicative Study Area (500m from centre of Proposed Route)
- Woodland
- Watercourses and Waterbody

Building Roosts

- Bat Roost (1A)
- Bat Roost (1B)
- Potential Bat Roost (2A)
- Potential Bat Roost (2B)
- No Potential as a Bat Roost (3)
- Roost Identified by Aberdeen Bat Group
- Emergence Survey Done (Roost Not Confirmed)
- Emergence Survey Done (Roost Confirmed)

Individual & Multiple Tree Roosts

- Bat Roost (1A)
- Bat Roost (1B)
- Potential Bat Roost (2A)
- Potential Bat Roost (2B)

Habitat Assessment

- High & Medium Potential (roosting, foraging, commuting - see report)

Bridges / Culverts Roost Potential

- H M L High, Medium & Low

Rev	Date	Purpose of Revision	Drwn	Chkd	Appd

JACOBS
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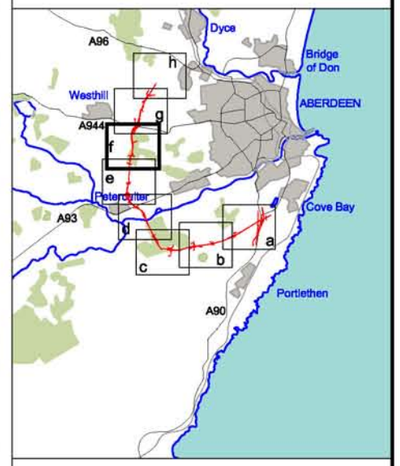
Client	Aberdeen Western Peripheral Route
Project	Aberdeen Western Peripheral Route Environmental Statement 2007 Additional Survey Report : Bats
Title	Bat Habitat Surveys Sheet 5 of 8
Drawing Status	FINAL
JB No.	0010332
Figure No.	FIGURE 25.5e
Revisions	
Scale	1:10,000
Date	Oct 2007
Drawn	SHF
Checked	PG
Approved	SH

FIGURE 25.5f



NORTH

A 944

DEN BURN

Continued on Sheet 7 of 8 (Figure 25.5g)

Ecological Section SL 6

Ecological Section SL 5

AUCHLEA

MOSS OF AUCHLEA

SILVER BURN

MOSS OF AUCHLEA DRAINAGE SYSTEM

SILVERBURN

GARN BURN

TRIB OF ORD BURN

ORD BURN

UPPER BEANSHILL BURN

Continued on Sheet 5 of 8 (Figure 25.5e)

Ecological Section SL 5

Ecological Section SL 4

BEANSHILL PONDS

0 1km 2km

LEGEND

- Proposed Route (Engineering Profile 04/05/07)
- Indicative Study Area (500m from centre of Proposed Route)
- Woodland
- Watercourses and Waterbody

Building Roosts

- Bat Roost (1A)
- Bat Roost (1B)
- Potential Bat Roost (2A)
- Potential Bat Roost (2B)
- No Potential as a Bat Roost (3)
- Roost Identified by Aberdeen Bat Group
- Emergence Survey Done (Roost Not Confirmed)
- Emergence Survey Done (Roost Confirmed)

Individual & Multiple Tree Roosts

- Bat Roost (1A)
- Bat Roost (1B)
- Potential Bat Roost (2A)
- Potential Bat Roost (2B)

Habitat Assessment

- High & Medium Potential (roosting, foraging, commuting - see report)

Bridges / Culverts Roost Potential

- H M L High, Medium & Low

Rev	Date	Purpose of Revision	Drwn	Chkd	Appd

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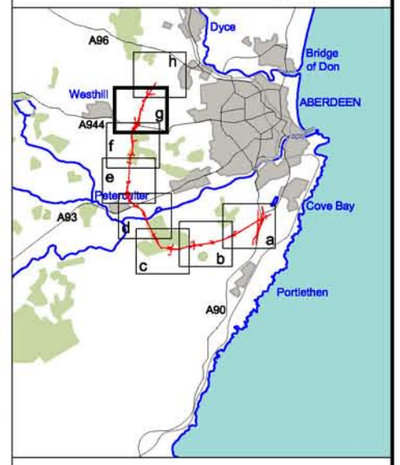
Client	Aberdeen Western Peripheral Route
Project	Aberdeen Western Peripheral Route Environmental Statement 2007 Additional Survey Report : Bats
Title	Bat Habitat Surveys Sheet 6 of 8
Drawing Status	FINAL
JB No.	0010332
Figure No.	FIGURE 25.5f
Revisions	
Scale	1:10,000
Date	Oct 2007
Drawn	SHF
Checked	PG
Approved	SH

FIGURE 25.5g



NORTH

Continued on Sheet 8 of 8 (Figure 25.5h)

Continued on Sheet 6 of 8 (Figure 25.5f)

BORROWSTONE POND

BORROWSTONE BURN

BUCK'S BURN

BRODIACH BURN

WESTHOLME BURN

DEN BURN

CLOGHILL

KINGSWELLS

WEST HATTON

SOUTH KINGSWELLS JUNCTION

111000

110000

109000

Ecological Section SL 6

Ecological Section SL 5

0 1km 2km

LEGEND

- Proposed Route (Engineering Profile 04/05/07)
- Indicative Study Area (500m from centre of Proposed Route)
- Woodland
- Watercourses and Waterbody

Building Roosts

- Bat Roost (1A)
- Bat Roost (1B)
- Potential Bat Roost (2A)
- Potential Bat Roost (2B)
- No Potential as a Bat Roost (3)
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Individual & Multiple Tree Roosts

- Bat Roost (1A)
- Bat Roost (1B)
- Potential Bat Roost (2A)
- Potential Bat Roost (2B)

Habitat Assessment

- High & Medium Potential (roosting, foraging, commuting - see report)

Bridges / Culverts Roost Potential

- H M L High, Medium & Low

Rev	Date	Purpose of Revision	Drwn	Chkd	Appd

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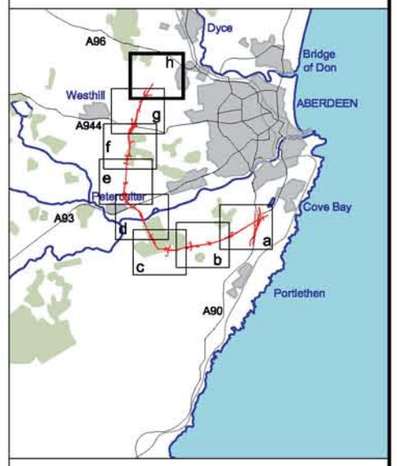
Project	Aberdeen Western Peripheral Route Environmental Statement 2007 Additional Survey Report : Bats
Title	Bat Habitat Surveys Sheet 7 of 8
Drawing Status	FINAL
JB No.	0010332
Figure No.	FIGURE 25.5g
Revisions	
Scale	1:10,000
Date	Oct 2007
Drawn	SHF
Checked	PG
Approved	SH

FIGURE 25.5h



NORTH

BRIMMOND HILL

Brimmond Country Park

BORROWSTONE POND

KEPPELHILL BURN

111000

Continued on Sheet 7 of 8 (Figure 25.5g)

Start of Northern Leg (Part B)

Start of Southern Leg (Part C)

0 1km 2km

LEGEND

- Proposed Route (Engineering Profile 04/05/07)
- Indicative Study Area (500m from centre of Proposed Route)
- Woodland
- Watercourses and Waterbody

Building Roosts

- Bat Roost (1A)
- Bat Roost (1B)
- Potential Bat Roost (2A)
- Potential Bat Roost (2B)
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Individual & Multiple Tree Roosts

- Bat Roost (1A)
- Bat Roost (1B)
- Potential Bat Roost (2A)
- Potential Bat Roost (2B)

Habitat Assessment

- High & Medium Potential (roosting, foraging, commuting - see report)

Bridges / Culverts Roost Potential

- H M L High, Medium & Low

Rev	Date	Purpose of Revision	Drwn	Chkd	Appd

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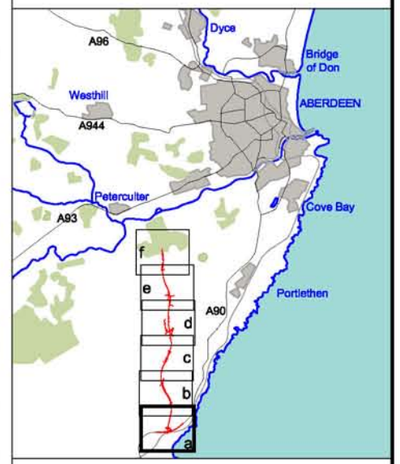
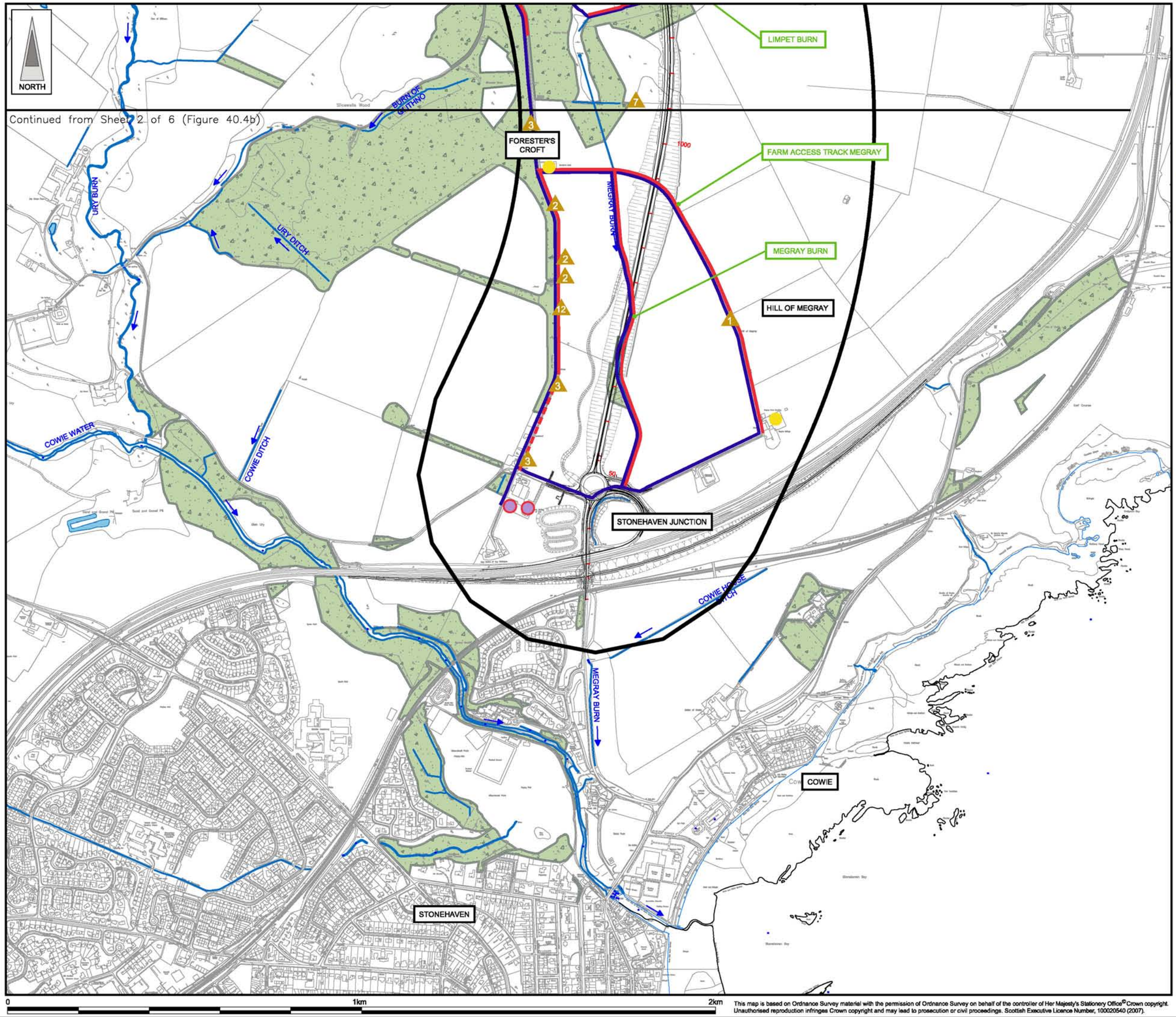
Project	Aberdeen Western Peripheral Route Environmental Statement 2007 Additional Survey Report : Bats
Title	Bat Habitat Surveys Sheet 8 of 8
Drawing Status	FINAL
JB No.	0010332
Figure No.	FIGURE 25.5h
Revisions	
Scale	1:10,000
Date	Oct 2007
Drawn	SHF
Checked	PG
Approved	SH

FIGURE 40.4a





0 1km 2km

LEGEND

- Proposed Route (Engineering Profile 04/05/07)
- Indicative Study Area (500m from centre of Proposed Route)
- Woodland
- Watercourses and Waterbody

Building Roosts / Individual & Multiple Tree Roosts

- Direct Evidence of Current Use by Bats (1A)
- Evidence of Recent Use by Bats (1B)
- Roost Identified by Aberdeen Bat Group
- Emergence Survey Done (Roost Confirmed)

Bat Activity

- Foraging (numeric value for number of passes)
- Foraging (number of passes exceeding 30)
- Foraging (number of passes exceeding 100)
- Pipistrelle Bat
- Natterer's Bat
- Daubenton's Bat
- Brown Long-eared Bat
- Potential Leisler's Bat Sighting

Commuting Routes

- Actual / Potential
- BURNHEAD — Commuting Route Reference Label

Survey Route

- 2006 / 2004

Rev	Date	Purpose of Revision	Drwn	Chkd	Appd

JACOBS
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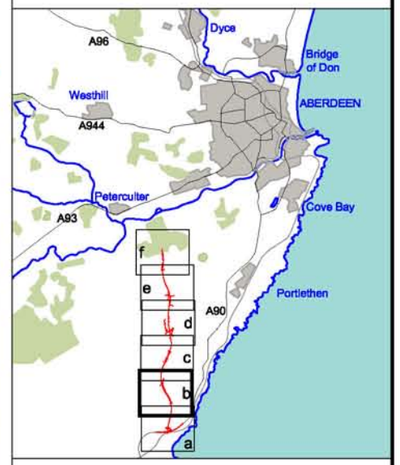
Tel: 0141 204 2511 Fax: 0141 226 3109
www.jacobsbabtie.com

Client	Aberdeen Western Peripheral Route
Project	Aberdeen Western Peripheral Route Environmental Statement 2007 Additional Survey Report : Bats
Title	Bat Activity Surveys Sheet 1 of 6
Drawing Status	FINAL
JB No.	0010332
Figure No.	FIGURE 40.4a
Revisions	
Scale	1:10,000
Date	Oct 2007
Drawn	SHF
Checked	PG
Approved	SH

FIGURE 40.4b



NORTH

Continued from Sheet 3 of 6 (Figure 40.4c)

HOWIESHILL BURN

CANTLAYHILLS

Ecological Section FL 2

Ecological Section FL 1

FISHERMYRE POND

FISHERMYRE ROAD

GREEN DITCH

GREEN BURN

KEMPSTONE HILL

CONEYHATCH BURN

CONEYHATCH

LIMPET BURN

LIMPET DITCH

ROAD THROUGH MEGRAY WOOD

FARM ACCESS TRACK MEGRAY

BURN OF SKITHNO

FORESTER'S CROFT

Continued from Sheet 1 of 6 (Figure 40.4a)

0 1km 2km

LEGEND

- Proposed Route (Engineering Profile 04/05/07)
- Indicative Study Area (500m from centre of Proposed Route)
- Woodland
- Watercourses and Waterbody

Building Roosts / Individual & Multiple Tree Roosts

- Direct Evidence of Current Use by Bats (1A)
- Evidence of Recent Use by Bats (1B)
- Roost Identified by Aberdeen Bat Group
- Emergence Survey Done (Roost Confirmed)

Bat Activity

- Foraging (numeric value for number of passes)
- Foraging (number of passes exceeding 30)
- Foraging (number of passes exceeding 100)
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- Actual / Potential
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Survey Route

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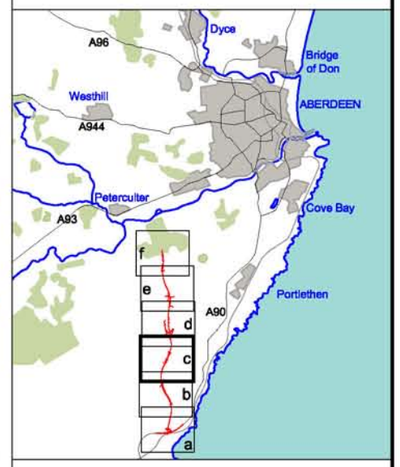
Project	Aberdeen Western Peripheral Route Environmental Statement 2007 Additional Survey Report : Bats
Title	Bat Activity Surveys Sheet 2 of 6
Drawing Status	FINAL
JB No.	0010332
Figure No.	FIGURE 40.4b
Revisions	
Scale	1:10,000
Date	Oct 2007
Drawn	SHF
Checked	PG
Approved	SH

FIGURE 40.4c



Continued from Sheet 4 of 6 (Figure 40.4d)

Continued on Sheet 2 of 6 (Figure 40.4b)

NORTH

BURN OF MUCHALLS

GREENHEADS DITCH

ROAD PAST ELRICK

BURN OF BLACKBUTTS

MUCHALLS DITCHES

BURN OF MUCHALLS PONDS

BURN OF MUCHALLS

BURNSIDE

BACK BURN

ALLOCHIE BURN

HILLOCKS BURN

HOWIESHILL BURN

CANTLAYHILLS

Ecological Section FL 2

0 1km 2km

LEGEND

- Proposed Route (Engineering Profile 04/05/07)
- Indicative Study Area (500m from centre of Proposed Route)
- Woodland
- Watercourses and Waterbody

Building Roosts / Individual & Multiple Tree Roosts

- Direct Evidence of Current Use by Bats (1A)
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- Roost Identified by Aberdeen Bat Group
- Emergence Survey Done (Roost Confirmed)

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- Brown Long-eared Bat
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Commuting Routes

- Actual / Potential
- BURNHEAD Commuting Route Reference Label

Survey Route

- 2006 / 2004

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Project: Aberdeen Western Peripheral Route
Environmental Statement 2007 Additional Survey Report : Bats

Title: Bat Activity Surveys
Sheet 3 of 6

Drawing Status	FINAL
JB No.	0010332
Figure No.	FIGURE 40.4c
Revisions	
Scale	1:10,000
Date	Oct 2007
Drawn	SHF
Checked	PG
Approved	SH

FIGURE 40.4d

NORTH

TRIB OF ELSICK BURN
SOUTH ROTHNICK BURN
EAST ROTHNICK BURN
NORTH ROTHNICK BURN
8000
EAST ROTHNICK (BURN OF ELSICK)
BALNAGUBS BURN
EAST ROTHNICK (BALNAGUBS BURN)
BURN OF ELSICK
STONEYHILL DITCH
7000
RED MOSS
RED MOSS (SSSI)
COOKNEY
6000
COOKNEY DITCH
ROAD THROUGH COOKNEY
ROAD PAST ELRICK
GREENHEADS DITCH
BURN OF MUCHALLS

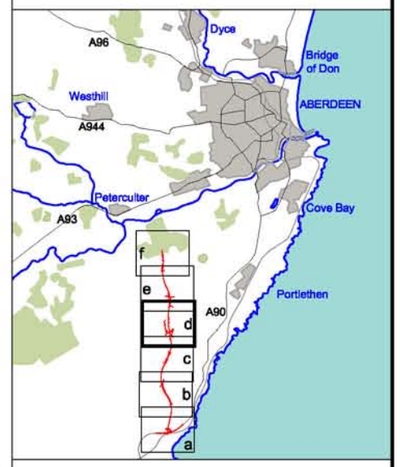
Continued from Sheet 5 of 6 (Figure 40.4e)

Ecological Section FL 3

Ecological Section FL 2

Continued from Sheet 3 of 6 (Figure 40.4c)

0 1km 2km



LEGEND

- Proposed Route (Engineering Profile 04/05/07)
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- Woodland
- Watercourses and Waterbody

Building Roosts / Individual & Multiple Tree Roosts

- Direct Evidence of Current Use by Bats (1A)
- Evidence of Recent Use by Bats (1B)
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- Emergence Survey Done (Roost Confirmed)

Bat Activity

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- Foraging (number of passes exceeding 30)
- Foraging (number of passes exceeding 100)
- Pipistrelle Bat
- Natterer's Bat
- Daubenton's Bat
- Brown Long-eared Bat
- Potential Leisler's Bat Sighting

Commuting Routes

- Actual / Potential
- BURNHEAD — Commuting Route Reference Label

Survey Route

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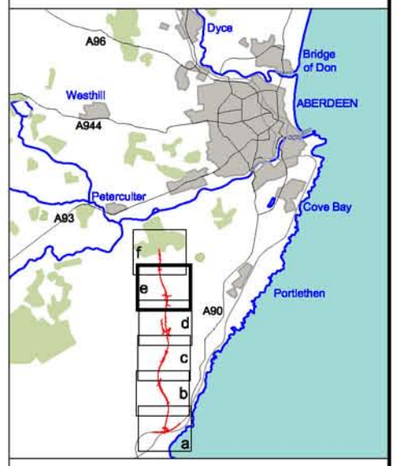
Title	Bat Activity Surveys Sheet 4 of 6
Drawing Status	FINAL
JB No.	0010332
Figure No.	FIGURE 40.4d
Revisions	
Scale	1:10,000
Date	Oct 2007
Drawn	SHF
Checked	PG
Approved	SH

FIGURE 40.4e



NORTH

Continued on Sheet 6 of 6 (Figure 40.4f)

BETWEEN STRANOG CROSSROADS AND CRAIGTATH FARM (GREENS OF CRYNOCH)

GREENS OF CRYNOCH BURN

CRAIGTATH BURN

STRANOG BURN

SQUARE BURN

CIRCLE BURN

WESTSIDE BURN

STRANOG HILL

CAIRNS BURN

CAIRNFIELD BURN

EAST CROSSLEY BURN

CROSSLEY QUARRY POND

CROSSLEY BURN

WHITESIDE BURN

NORTH ROTHNICK

ROTHNICK

NORTH ROTHNICK

EAST ROTHNICK BURN

NORTH ROTHNICK BURN

TRIB OF ELSICK BURN

SOUTH ROTHNICK BURN

EAST ROTHNICK (BURN OF ELSICK)

Continued on Sheet 4 of 6 (Figure 40.4d)

0 1km 2km

LEGEND

- Proposed Route (Engineering Profile 04/05/07)
- Indicative Study Area (500m from centre of Proposed Route)
- Woodland
- Watercourses and Waterbody

Building Roosts / Individual & Multiple Tree Roosts

- Direct Evidence of Current Use by Bats (1A)
- Evidence of Recent Use by Bats (1B)
- Roost Identified by Aberdeen Bat Group
- Emergence Survey Done (Roost Confirmed)

Bat Activity

- Foraging (numeric value for number of passes)
- Foraging (number of passes exceeding 30)
- Foraging (number of passes exceeding 100)
- Pipistrelle Bat
- Natterer's Bat
- Daubenton's Bat
- Brown Long-eared Bat
- Potential Leisler's Bat Sighting

Commuting Routes

- Actual / Potential
- BURNHEAD — Commuting Route Reference Label

Survey Route

- 2006 / 2004

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Title	Bat Activity Surveys Sheet 5 of 6
Drawing Status	FINAL
JB No.	0010332
Figure No.	FIGURE 40.4e
Revisions	
Scale	1:10,000
Date	Oct 2007
Drawn	SHF
Checked	PG
Approved	SH

FIGURE 40.4f

NORTH

Ecological Section SL 3

Ecological Section SL 2

Ecological Section FL 3

KINGCAUSIE

BLAIKIEWELL BURN

DURRIS BURN

CLEANHILL JUNCTION

BLAIKIEWELL

BURNHEAD

BURNHEAD BURN

WHITESTONE BURN

MERCHANT'S CROFT

BARNHILL BURN

SWELLHEAD BURN

WOOD BURN

CRAIGENTATH DITCH

WEDDERHILL BURN

GREENS OF CRYNOCH BURN

CRAIGENTATH BURN

STRANOG BURN

SQUARE BURN

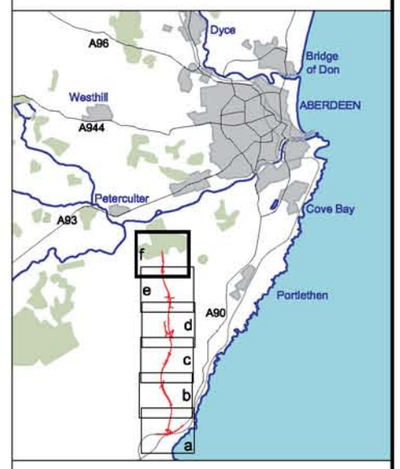
BETWEEN STRANOG CROSSROADS AND CRAIGTATH FARM (GREENS OF CRYNOCH)

Start of Southern Leg (Part C)

Start of Eastlink (Part D)

Continued on Sheet 5 of 6 (Figure 40.4e)

0 1km 2km



LEGEND

- Proposed Route (Engineering Profile 04/05/07)
- Indicative Study Area (500m from centre of Proposed Route)
- Woodland
- Watercourses and Waterbody

Building Roosts / Individual & Multiple Tree Roosts

- Direct Evidence of Current Use by Bats (1A)
- Evidence of Recent Use by Bats (1B)
- Roost Identified by Aberdeen Bat Group
- Emergence Survey Done (Roost Confirmed)

Bat Activity

- Foraging (numeric value for number of passes)
- Foraging (number of passes exceeding 30)
- Foraging (number of passes exceeding 100)
- Pipistrelle Bat
- Natterer's Bat
- Daubenton's Bat
- Brown Long-eared Bat
- Potential Leisler's Bat Sighting

Commuting Routes

- Actual / Potential
- BURNHEAD — Commuting Route Reference Label

Survey Route

- 2006 / 2004

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Title	Bat Activity Surveys Sheet 6 of 6
Drawing Status	FINAL
JB No.	0010332
Figure No.	FIGURE 40.4f
Revisions	
Scale	1:10,000
Date	Oct 2007
Drawn	SHF
Checked	PG
Approved	SH

FIGURE 40.5a

Continued from Sheet 2 of 6 (Figure 40.5b)

NORTH

FORESTER'S CROFT

HILL OF MEGRAY

STONEHAVEN JUNCTION

COWIE

STONEHAVEN

BURN OF GEITHNO

URY BURN

URY DITCH

COWIE WATER

COWIE DITCH

MEGRAY BURN

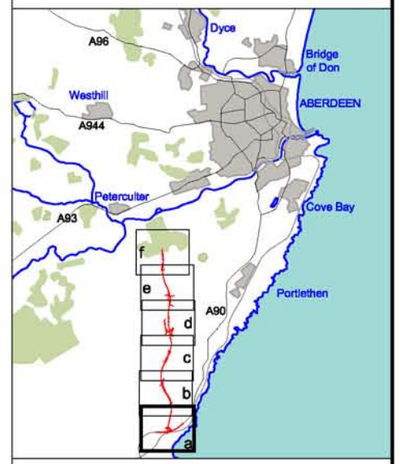
COWIE HOUSE DITCH

MEGRAY BURN

1000

50

0 1km 2km



LEGEND

- Proposed Route (Engineering Profile 04/05/07)
- Indicative Study Area (500m from centre of Proposed Route)
- Woodland
- Watercourses and Waterbody

Building Roosts

- Bat Roost (1A)
- Bat Roost (1B)
- Potential Bat Roost (2A)
- Potential Bat Roost (2B)
- No Potential as a Bat Roost (3)
- Roost Identified by Aberdeen Bat Group
- Emergence Survey Done (Roost Not Confirmed)
- Emergence Survey Done (Roost Confirmed)

Individual & Multiple Tree Roosts

- Bat Roost (1A)
- Bat Roost (1B)
- Potential Bat Roost (2A)
- Potential Bat Roost (2B)

Habitat Assessment

- High & Medium Potential (roosting, foraging, commuting - see report)

Bridges / Culverts Roost Potential

- H M L High, Medium & Low

Rev	Date	Purpose of Revision	Drwn	Chkd	Appd

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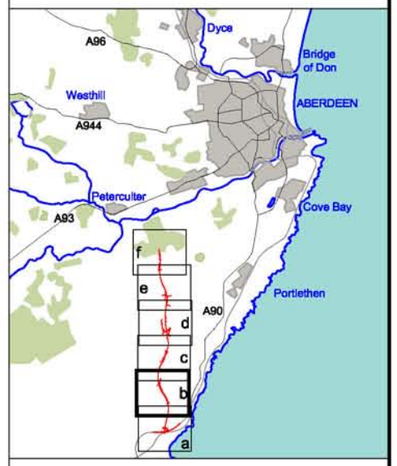
Project	Aberdeen Western Peripheral Route Environmental Statement 2007 Additional Survey Report : Bats
Title	Bat Habitat Surveys Sheet 1 of 6
Drawing Status	FINAL
JB No.	0010332
Figure No.	FIGURE 40.5a
Revisions	
Scale	1:10,000
Date	Oct 2007
Drawn	SHF
Checked	PG
Approved	SH

FIGURE 40.5b



NORTH

Continued from Sheet 3 of 6 (Figure 40.5c)

HOWIESHILL BURN

CANTLAYHILLS

Ecological Section FL 2

Ecological Section FL 1

FISHERMYRE POND

GREEN DITCH

GREEN BURN

KEMPSTONE HILL

CONEYHATCH BURN

CONEYHATCH

LIMPET BURN

LIMPET DITCH

FORESTER'S CROFT

BURN OF GOTHNO

MEGRAY

Continued from Sheet 1 of 6 (Figure 40.5a)

0 1km 2km

LEGEND

- Proposed Route (Engineering Profile 04/05/07)
- Indicative Study Area (500m from centre of Proposed Route)
- Woodland
- Watercourses and Waterbody

Building Roosts

- Bat Roost (1A)
- Bat Roost (1B)
- Potential Bat Roost (2A)
- Potential Bat Roost (2B)
- No Potential as a Bat Roost (3)
- Roost Identified by Aberdeen Bat Group
- Emergence Survey Done (Roost Not Confirmed)
- Emergence Survey Done (Roost Confirmed)

Individual & Multiple Tree Roosts

- Bat Roost (1A)
- Bat Roost (1B)
- Potential Bat Roost (2A)
- Potential Bat Roost (2B)

Habitat Assessment

- High & Medium Potential (roosting, foraging, commuting - see report)

Bridges / Culverts Roost Potential

- H M L High, Medium & Low

Rev	Date	Purpose of Revision	Drwn	Chkd	Appd

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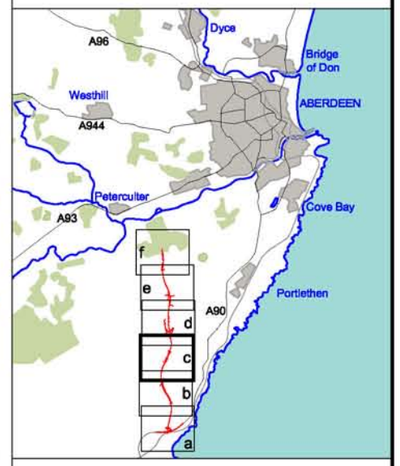
Client	Aberdeen Western Peripheral Route
Project	Aberdeen Western Peripheral Route Environmental Statement 2007 Additional Survey Report : Bats
Title	Bat Habitat Surveys Sheet 2 of 6
Drawing Status	FINAL
JB No.	0010332
Figure No.	FIGURE 40.5b
Revisions	
Scale	1:10,000
Date	Oct 2007
Drawn	SHF
Checked	PG
Approved	SH

FIGURE 40.5c



Continued from Sheet 4 of 6 (Figure 40.5d)

Continued on Sheet 2 of 6 (Figure 40.5b)

NORTH

BURN OF MUCHALLS

MUCHALLS DITCHES

BURN OF MUCHALLS PONDS

GREENHEADS DITCH

BURN OF BLACKBUTTS

BURNSIDE

BACK BURN

ALLOCHIE BURN

HILLOCKS BURN

HOWIESHILL BURN

CANTLAYHILLS

6000

5000

4000

0 1km 2km

Ecological Section FL 2

LEGEND

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- Indicative Study Area (500m from centre of Proposed Route)
- Woodland
- Watercourses and Waterbody

Building Roosts

- Bat Roost (1A)
- Bat Roost (1B)
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- Potential Bat Roost (2B)

Habitat Assessment

- High & Medium Potential (roosting, foraging, commuting - see report)

Bridges / Culverts Roost Potential

- H M L High, Medium & Low

Rev	Date	Purpose of Revision	Drwn	Chkd	Appd

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Client	Aberdeen Western Peripheral Route
Project	Aberdeen Western Peripheral Route Environmental Statement 2007 Additional Survey Report : Bats
Title	Bat Habitat Surveys Sheet 3 of 6
Drawing Status	FINAL
JB No.	0010332
Figure No.	FIGURE 40.5c
Revisions	
Scale	1:10,000
Date	Oct 2007
Drawn	SHF
Checked	PG
Approved	SH

FIGURE 40.5d

NORTH

TRIB OF ELSICK BURN

EAST ROTHNICK BURN

NORTH ROTHNICK BURN

SOUTH ROTHNICK BURN

BALNAGUBS BURN

BURN OF ELSICK

8000

7000

6000

Continued from Sheet 5 of 6 (Figure 40.5e)

RED MOSS

RED MOSS (SSSI)

COOKNEY

STONEYHILL DITCH

COOKNEY DITCH

GREENHEADS DITCH

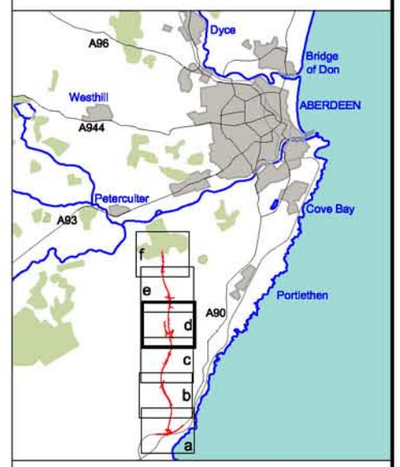
BURN OF MUCHALLS

Ecological Section FL 3

Ecological Section FL 2

Continued from Sheet 3 of 6 (Figure 40.5c)

0 1km 2km



LEGEND

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Habitat Assessment

- High & Medium Potential (roosting, foraging, commuting - see report)

Bridges / Culverts Roost Potential

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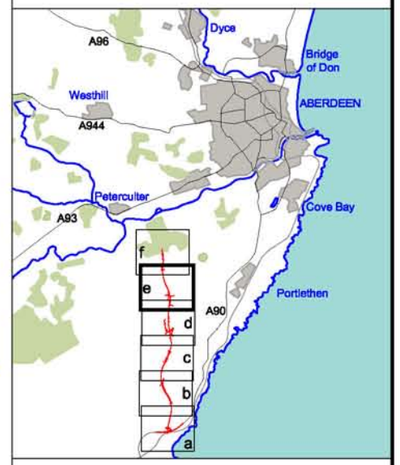
Client	Aberdeen Western Peripheral Route
Project	Aberdeen Western Peripheral Route Environmental Statement 2007 Additional Survey Report : Bats
Title	Bat Habitat Surveys Sheet 4 of 6
Drawing Status	FINAL
JB No.	0010332
Figure No.	FIGURE 40.5d
Revisions	
Scale	1:10,000
Date	Oct 2007
Drawn	SHF
Checked	PG
Approved	SH

FIGURE 40.5e



Continued on Sheet 6 of 6 (Figure 40.5f)

Continued on Sheet 4 of 6 (Figure 40.5d)

NORTH

GREENS OF CRYNOCH BURN
CRAIGENTATH BURN
STRANOG BURN
10000
SQUARE BURN
CIRCLE BURN
WESTSIDE BURN
STRANOG HILL
CAIRNS BURN
CAIRNFIELD BURN
EAST CROSSLEY BURN
CROSSLEY QUARRY POND
9000
CROSSLEY BURN
WHITESIDE BURN
NORTH ROTHNICK
EAST ROTHNICK BURN
TRIB OF ELSICK BURN
NORTH ROTHNICK BURN
8000
SOUTH ROTHNICK BURN

0 1km 2km

LEGEND

- Proposed Route (Engineering Profile 04/05/07)
- Indicative Study Area (500m from centre of Proposed Route)
- Woodland
- Watercourses and Waterbody

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Title	Bat Habitat Surveys Sheet 5 of 6
Drawing Status	FINAL
JB No.	0010332
Figure No.	FIGURE 40.5e
Revisions	
Scale	1:10,000
Date	Oct 2007
Drawn	SHF
Checked	PG
Approved	SH

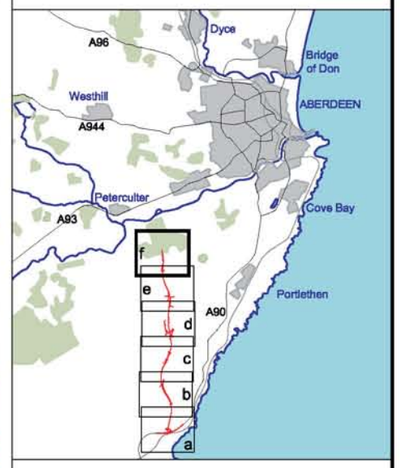
FIGURE 40.5f

NORTH

KINGCAUSIE POND
KINGCAUSIE BURN
GLENBURNIE & ONLINE PONDS
CRYNOCH BURN
BLAIKIEWELL BURN
Ecological Section SL 3
Ecological Section SL 2
POND AT HILL OF BLAIRS
CLEANHILL JUNCTION
DURRIS BURN
Ecological Section SL 3
Ecological Section FL 3
BLAIKIEWELL
BURNHEAD
WHITESTONE BURN
BURNHEAD BURN
BARNHILL BURN
SWELLHEAD BURN
WOOD BURN
CRAIGENTATH DITCH
WEDDERHILL BURN
GREENS OF CRYNOCH BURN
CRAIGENTATH BURN
STRANOG BURN
SQUARE BURN
11000
10000
Start of Southern Leg (Part C)
Start of Fastlink (Part D)

Continued on Sheet 5 of 6 (Figure 40.5e)

0 1km 2km



LEGEND

- Proposed Route (Engineering Profile 04/05/07)
- Indicative Study Area (500m from centre of Proposed Route)
- Woodland
- Watercourses and Waterbody

Building Roosts

- Bat Roost (1A)
- Bat Roost (1B)
- Potential Bat Roost (2A)
- Potential Bat Roost (2B)
- No Potential as a Bat Roost (3)
- Roost Identified by Aberdeen Bat Group
- Emergence Survey Done (Roost Not Confirmed)
- Emergence Survey Done (Roost Confirmed)

Individual & Multiple Tree Roosts

- Bat Roost (1A)
- Bat Roost (1B)
- Potential Bat Roost (2A)
- Potential Bat Roost (2B)

Habitat Assessment

- High & Medium Potential (roosting, foraging, commuting - see report)

Bridges / Culverts Roost Potential

- H M L High, Medium & Low

Rev	Date	Purpose of Revision	Drwn	Chkd	Appd

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Client	Aberdeen Western Peripheral Route
Project	Aberdeen Western Peripheral Route Environmental Statement 2007 Additional Survey Report : Bats
Title	Bat Habitat Surveys Sheet 6 of 6
Drawing Status	FINAL
JB No.	0010332
Figure No.	FIGURE 40.5f
Revisions	
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