6 ECOLOGY AND NATURE CONSERVATION

6.1 Introduction

6.1.1 Background

This chapter describes and evaluates the current ecological interest in relation to the proposed works on the A77 between Dutch House Roundabout and Spittalhill Interchange and assesses the potential effects of the road scheme on those interests.

The assessment process requires the identification of key ecological features (resources) in an area and determination of the following:

- Their value;
- The sources of impact and the sensitivity of receptors to these;
- The nature, scale and duration of any effects (both direct and indirect) of the proposal upon sensitive receptors;
- Potential mitigation measures to reduce any negative effects; and
- Assessment of the significance of any residual effects.

6.1.2 Study Area

The study area for the ecological surveys was a 1km wide corridor, centred on the A77 carriageway, dominated by agricultural fields with shelterbelts, small woodlands, farmsteads, the small settlement of Hansel Village, and the larger village of Symington. The badger survey corridor was increased to a 2km wide buffer, centred on the A77 carriageway, in response to a request by Scottish Natural Heritage (SNH) (See Confidential Annex – Appendix 8). Two main watercourses, Pow Burn and the Dow's Burn, run east to west parallel to the road, and both north and south of the road. The main remaining habitat types are woodland, scrub, grasslands, arable ground and hedgerows. Overall the diversity of the survey corridor is not high due to its agricultural and managed nature. There are areas of relatively higher diversity linked to hedgerows, the burns, and the Coodham Estate.

6.2 Policy and Guidance

The following general description of the methodology highlights particular features of the techniques used in the assessment of ecological impacts. There is no single agreed method for ecological impact assessment, although certain general principles and approaches appear to be widely accepted. The method used for this study provides a systematic and transparent assessment of the significance of impacts upon ecological features. It is based upon current best practice outlined in legislation and planning policy (e.g. Planning Advice Note 58, Environmental Impact Assessment), incorporates the principles set out in the guidance for Ecological Impact Assessment developed by a working group of the Institute of Ecology and Environmental Management (IEEM) (IEEM, 2006), and incorporates

good practice from other published documents e.g. the Design Manual for Roads and Bridges (DMRB) Volume 11: Environmental Assessment (Highways Agency; June 1993 and subsequent amendments) and relevant supplementary guidance. Guidance for environmental mitigation provided in DMRB Volume 10: Environmental Design and Management (Highways Agency; February 2001).

The methodology for the ecology chapter of the Environmental Statement also takes account of The Environmental Impact Assessment (Scotland) Regulations, 1999, and adheres to the requirements of, and advice given in the following legislation and guidance:

- The Conservation (Natural Habitats, &c.) Regulations 1994;
- Wildlife and Countryside Act 1981, as amended;
- The Nature Conservation (Scotland) Act 2004;
- Water Environment (Controlled Activities) (Scotland) Regulations 2005;
- Water Framework Directive, 2000. EU Directive 2000/60/EC;
- The UK Biodiversity Action Plan (UKBAP);
- The Ayrshire Local Biodiversity Action Plan (LBAP); and
- Guidelines for Baseline Ecological Assessment (IEA, 1995).

The specific requirements and guidance set out in the above documents are discussed in more detail in the relevant sections of this chapter.

6.3 Consultations

The consultation and scoping process is based on information about the Scheme and the area that it will affect. It should help to develop an understanding of the ecological context based on the baseline information derived from existing ecological information, data gathering, and literature searches (IEEM, 2006). The scoping exercise should also identify those factors that are required to be assessed in more detail.

A formal scoping report was sent to Forestry Commission, Scottish Environment Protection Agency (SEPA), Scottish Executive Environment and Rural Affairs Dept. (SEERAD), SNH, Scottish Water, SEERAD - Fisheries and Rural Development Group and South Ayrshire Council, requesting a formal scoping opinion for the proposed Scheme. Further consultations were also undertaken with a number of other non-statutory organisations relating to ecological issues.

For a complete Consultee Response Schedule, including consultations carried out at preceding stages, see Chapter 1. A summary of ecological responses where key issues were raised in time to be included in the E.S. is contained in Table 6.1.

Table 6.1: Ecology and Nature Conservation Consultees

Consultee	Consultee Response Summary
Statutory Consultees	
Scottish Environment Protection Agency	Sustainable Urban Drainage Systems (SUDS) will be required for both completed road and construction drainage. The discharge from the road drainage SUDS may require Controlled Activities Regulations (CAR) licences. One thing not mentioned in the (scoping) report is that there may be discharge pipes serving septic tanks in the area of the works, which may be affected.
Scottish Natural Heritage	Think that Scoping contains enough ecological issues to inform full ES, although concern at Badgers (*Meles meles*) turning up as road kill in 2003/04, although surveys indicate no presence in vicinity. May suggest badger/otter (*Lutra lutra*) road crossing mitigation measures as numbers may increase in future.
Non-statutory Consultees	
Ayrshire Rivers Trust	Does have data on fish for watercourses but not for Pow Burn, and suspect that there is no recent data available for the Burn. Recommend that an electrofishing survey of the watercourses is undertaken prior to the commencement of works. ART have no concerns but would like to see the following included in ES: Survey and appraisal of fish population and migratory access; appropriate mitigation for watercourses; SUDS; silt control measures; provision for aquatic mammals such as otters.
Scottish Badgers	States that there is a Badger presence along section of road and that their database holds 5 recorded traffic accidents will make this info available as required. Recommend survey 1km either side of road and production of Badger Mitigation Plan. Provide table of Grid Ref locations of Road Traffic Accident details.
Scottish Wildlife Trust	Only Local Wildlife Site that could be affected is Coodham Estate. Salty drainage water from A77 has been blamed for damaging neighbouring trees along boundary of estate in the past. Encourages use of native trees and shrubs and locally sourced wildlife seeds for landscape to benefit insects and other invertebrates.

6.4 Methodology

6.4.1 Desk-based Information

In addition to information sought from consultees listed above, relevant biological information was sought from The Vincent Wildlife Trust, Jim and Rosemary Green - Mammal Specialists and Mr. Tom Hastings - Countryside Ranger, East Ayrshire Council. In the absence of a local Biological Records Centre, the Scottish Wildlife Trust (SWT) was also contacted for local records of relevance. The SNH National Biodiversity Network database (NBN) and the Ayrshire LBAP and the Joint Ayrshire Structure Plan (approved January 2000) were also consulted.

6.4.2 Field Survey

The extent or area to be covered by ecological assessment varies depending upon the ecological context and type of development being considered. There is no standard 'buffer' area for a scheme within which impacts should be assessed, however SNH confirmed "*that a buffer zone of 500m either side of the A77 along the proposed works will be sufficient for the detailed appraisal of ecological issues in relation to hee A77 Symington to Bogend Toll upgrade*" (John Collie, SNH, consultation response letter dated 31st August). However, the badger survey corridor increased to a 2km wide buffer, centred on the A77 carriageway, in response to a request by SNH.

JDC Ecology Limited (JDC) carried out the majority of the field survey work and the information presented here is taken directly from A77 Symington and Bogend Toll, Stage 2 Report, Scheme Options Assessment, Part 2, Environmental Assessment, Addendum: Ecology (JDC Ecology Ltd., September 2006). Garry Nixon Wildlife Consultant carried out bat survey work on behalf of JDC. Further badger and bat surveys were undertaken by Scott Wilson (SW) ecologists during September-November 2005.

A Phase 1 Habitat Survey was carried out in October 2005 using standard methodology as given in the Handbook for Phase 1 Habitat survey (Nature Conservancy Council, 1990). This is a suitable survey month with regard to the habitat conditions at the site, although some plant species may no longer be obvious. Habitats were mapped and target notes made for areas of more interest.

A Breeding Bird Survey (BBS) was undertaken in May and June 2006 as per Bibby et al. (2000) in Bird Census Techniques. It is appropriate to the habitats at the site and utilised transects along the road corridor, recording bird species and activity.

Protected species surveys were undertaken at a number of different times. Otter surveys were undertaken in 2005, and the site was checked again during spring 2006. Water voles (*Arvicola terrestris*) were surveyed in spring 2006. The site area was surveyed for any signs of badger activity in the survey period in 2005 and again in Spring and Autumn 2006. Bat surveys were undertaken in October 2005 and September 2006.

The site was assessed for suitable breeding habitat for amphibians. As no such habitat lies within the area of impact no further work was deemed to be required.

The scoping and consultation exercise did not identify any other protected species or significant populations of mammals, fish, invertebrates, reptiles or vascular plants in the proposed study area that should be subject to specific surveys. There was also no indication from the statutory consultees that a wider area of study, outside the 500m buffer, should be assessed (exception in relation to badger outlined further below), as there was no indication that the construction would result in changes to water flows, and levels in sensitive wetland areas or disturb important breeding sites for birds beyond the study area (DMRB Vol. 11).

Within the scope of the project, there are no plans for direct impacts upon watercourses, therefore fish population studies were not undertaken as part of this assessment process, and were not requested by statutory consultees.

Consequently, no further survey work was undertaken, none has been recommended at a later stage, and these groups are not considered further within the ES.

However, incidental note was made of any other species or habitats of note that may be present on or near the site, particularly priority species and habitats in the Ayrshire LBAP.

A Global Positioning System (GPS) was used throughout the field survey work, to assist in the accuracy of the mapping, target note location, and all further observations.

Habitat Surveys

A Phase 1 survey provides a rapid assessment of habitat presence and quality. Whilst it is focussed upon categorisation of parcels of land based on their vegetation, the potential value of areas to fauna is also considered. Blocks of land are assigned to recognised broad-habitat categories (e.g. semi-improved grassland, running water), and marked on a map using either standard alphanumeric codes or standard mapping colour codes. Target notes are used to provide additional descriptions of features of particular note (e.g. key and characteristic species, presence of notable species). The purposes of the Phase 1 surveys undertaken for this study were to identify the type, quality and extent of habitats present within an area, and to identify any habitats or features that might require more detailed field investigations. Phase 1 survey is not to be regarded as a definitive representation of the conservation value or interest of any area of land. In addition, it must be noted that plant lists produced from one field survey do not record all species that may occur on a site in the course of a year, or over time.

A Phase 1 Habitat Survey was carried out in October 2005 using standard methodology as given in the Handbook for Phase 1 Habitat survey (Nature Conservancy Council, 1990). This is a suitable survey month with regard to the habitat conditions at the site, although some plant species may no longer be obvious. Habitats were mapped and target notes made for areas of more interest. The area of land surveyed lies between grid reference points NS 396 322 (Bogend Toll) to NS 360 286 (Dutch House Roundabout). An additional area of land to the north and east of Bogend Toll (up to grid reference point NS 408 339) was also surveyed and mapped for informational purposes. The land surveyed covers an area approximately 500m on either side of the A77, forming a corridor approximately 7km by 1km, where access permission allowed.

Breeding Birds

The study area includes agricultural grassland, trees, woodland, scrub, hedgerows, gardens, amenity grassland and built-up areas. The purpose of the survey was to determine the assemblage of breeding bird species using these areas of land, which may be directly and/or indirectly affected by the Scheme. Accordingly, birds seen or heard within 500m of the proposed Scheme boundary were recorded.

The standard Breeding Bird Survey methodology (Gilbert et al 1998) was modified for the proposed Scheme. Two surveys were conducted between 0630 and 0900 hours in May and June 2006. Streams and dense woodland areas were

investigated closely. The surveyor paused at regular intervals to scan and listen for calling and singing birds. When individuals or pairs of birds were encountered, the fieldworker determined whether the bird(s) were different from any previously encountered. This involved careful attention to the whereabouts and movements of birds, together with birds' sex and plumage characteristics. To minimise the risk of double counting, behaviour and location of birds were carefully observed so that previously encountered birds were not recorded twice. Surveys were not conducted in winds greater than Beaufort Force 5, in persistent rain or when visibility was poor.

The location and activities of all bird species from both visits were recorded on 1:10,000 maps using standard British Trust for Ornithology (BTO) codes (Marchant, 1983). Subsequent map analysis was carried out to produce an index of the species present and the estimated number of breeding territories for each species both north and south of the A77. Where birds were recorded in the same location on the first and second visits, the location of birds recorded was taken as equidistant from both mapped observations. Numbers of breeding birds were those recorded as showing the following breeding bird behaviour:

- Displaying or singing;
- Territorial dispute;
- Occupied nests;
- Repeated alarm calling or distraction displays;
- Adult(s) carrying food;
- Adult(s) carrying nest material; and/or
- Newly fledged young with adult(s).

Other records were considered to be of non-breeding birds, failed breeders or birds loafing, feeding or on passage to other areas.

Data gathered during the surveys is useful in providing an index of the species recorded within the survey area, but the breeding territories and breeding density should be treated as an estimate of the numbers of bird territories within the survey area.

Otter

The surveys involved searching for the range of otter signs (SNH, 1997) outlined below:

- Faeces ("spraints"): Highly characteristic droppings on prominent features such as rocks, logs, exposed roots etc, usually along the watercourse.
- Holts: Underground shelter, often at water's edge and can be directly into the bank, or may be beneath tree roots. Otters will also enlarge rabbit holes and will use rock-piles near the watercourse.
- Couches: Above ground shelter, frequently located beneath dense vegetation cover or in natural cavities formed by bank-side trees.
- Footprints: Diagnostic prints, usually along the river, burn or ditch edges.

- Feeding Remains: Remains of fish, frogs and other food, usually hauled out of the water and near the water's edge.

A survey was undertaken for otters in 2005, and the site was checked again during Spring 2006. The burns and the waterbody at Coodham Wood were checked for signs of otter, and consideration was taken of routes that otters would use to cross between the Pow Burn, in particular, and the Coodham Wood area.

Notes were taken of riparian habitat type, suitability and quality. Although sprainting levels may drop in the summer months (Chanin, 2003), the surveys were undertaken during favourable weather conditions. Water levels were low in all of the watercourses, and had been low for some time, meaning that recent signs of activity would not have been washed away by spate flows. During all surveys the locations of otter signs were established using a GPS receiver, which is accurate to approximately 10m.

Water Vole

Water voles were surveyed in Spring 2006. Water voles tend to confine their activity to within 3m of the bank edge along a watercourse. Field signs are:

- Faeces: 8-12mm long, 4-5mm wide; cylindrical and blunt ended; colour variable with food type. Most droppings left in latrines near the nest, at range boundaries, and at water entry points; often a pile of flattened old droppings with fresh on top; a few droppings may be scattered along runways.
- Latrine Sites: Concentrations of faeces, often with fresh droppings on top of old ones.
- Runways: Often 5-9cm broad and multi-branched; usually within 2m of water's edge and often forming tunnels through vegetation; not necessarily obvious; lead to water's edge or burrows.
- Burrows: 4-8cm diameter, wider than high; eroded entrances then contract to typical size; entrances located at water's edge; some entrances can occur in vegetation on bank surface up to 3m from the water; no spoil heaps.
- Nests: size and shape of a rugby ball, often in base of rushes, sedges or reeds; nest material taken into burrows and can sometimes be seen in tunnels from entrances.
- Feeding Stations: located along runways, or at platforms along water's edge; usually a pile of chewed vegetation in sections approx 10cm long; vegetation ends show marks of two large incisors; vegetation also taken into burrows. Piles of chopped grass, sedge or rush stems, rush pith and leaves.
- Lawns: Short, grazed vegetation around land entrances, often during nursing periods.
- Footprints: Difficult to tell from rat; adult hind foot 26-34mm (heel to claw); stride 120mm (smaller than rat); occur at water's edge and lead into vegetation.
- Sound: Characteristic 'plop' when a vole enters the water.

Given the aggressive predation on water vole by mink (*Mustela vison*), field signs of this species are also searched for and recorded.

Bats

Two sets of bat surveys were undertaken.

First Survey

The first bat surveys were undertaken in October 2005, by Garry Nixon Wildlife Consultant, on behalf of JDC (Report included in Appendix 8). Bat detection equipment was used along transects and during inspection of significant areas such as the trees around Rosemount and Hansel Village. The aim was to record the species of bats present in the area, significant navigation routes, and to assess the potential for roosts to be present in areas where road improvements may impact such roosts.

As this initial bat emergence survey was carried out at a sub-optimal time of year, some roost sites may not have been evident. However the results did give a good indication of the bat species present within the study area and the use of habitats by foraging bats.

Second Survey

The second bat survey was a detailed assessment of potential direct impacts upon bat roosts as part of the Scheme, undertaken during September 2006 by Scott Wilson (SW) ecologists. Detailed surveys were carried out on trees and other potential roosts structures that are likely to be in the direct line of the new routes. As no buildings or other man-made structures are going to be demolished to accommodate the Scheme, this bat survey centred on mature/ivy-clad trees which may provide bat roost potential. During daylight hours on 14th September, trees directly along the route alignment were surveyed from the ground for entrance holes to potential roosts. This included woodland surrounding Hansel Village, Trynlaw and along the proposed Rosemount to Brocket link road.

Potential roost sites in trees include obvious features such as cavities, frost cracks and trunk and branch splits, rot holes where branches have been removed and hollow sections of trunk, branches and roots. Bats can also roost in less obvious places such as under ivy, under loose bark, woodpecker holes and in bat or bird boxes. Given the diverse number and size of tree features in which roosts can occur, in practice it can be very difficult to say categorically whether a tree contains a bat roost or not. In addition, many of these features are not easily detectable from the ground, therefore binoculars were used to ascertain greater detail. It should also be noted that it was a sub-optimal time of year in which to carry out tree surveys for bats, as the dense tree canopy can mask all but the most obvious of roost sites.

External signs that bats are using a tree or a building as a roost site include:

- Suitable entry points in buildings/trees etc;
- Bat droppings: black droppings, 5-10mm long that crumble to a fine dust when crushed and may be located on the ground or stuck to walls;

- Staining: Secretions from bat fur can cause oily brown stains in the vicinity of roost entrances;
- Urine stains below the entrance to the roost;
- Audible squeaking from within the roost site;
- Large roost sites may produce an odour; and/or
- Flies around the entrance attracted by the smell of guano.

Based on the results of the daylight surveys, potential tree roosts were identified and emergence and activity surveys were carried out by trained ecologists using specialist bat equipment on the evening of 14th September 2006 using heterodyne BatBox III and a BatBox Duet bat detectors.

6.5 Assessment Methodology

To determine the significance of any effects of the proposed Scheme, it is necessary to define a robust assessment methodology. The method used is based upon various different protocols for the assessment of significance. The criteria draw on the IEEM guidelines for ecological impact assessment (IEEM, 2006) and also incorporate good practice from other published documents listed in Section 6.2 above. The assessment process is summarised below:

- The importance of nature conservation resources present are evaluated to place their relative biodiversity value, social/community value and economic value into context. The value of present are identified and placed in a geographic context from “international” to “zone of influence” levels;
- Elements of the proposed development that could potentially affect habitats and species or the wider environment are identified;
- Those habitats and species that might be affected by these elements either directly or indirectly are considered and existing conditions are defined;
- Likely impacts arising from the development and the effects (beneficial or negative) of these on species and their habitats are predicted, and where possible quantified. The geographic level at which these effects are considered to be significant is determined. The significance of the effects of developments was until recently determined using a standard matrix approach, however, the IEEM guidelines now suggest ecological experience and professional judgement should be integral part of the assessment process and impacts are described simply as “significant” or “not significant” at certain geographical levels, e.g. “significant at a local level” etc.
- Measures to avoid or reduce any significant effects, if possible, are then developed in conjunction with other elements of the design and mitigation for other environmental disciplines. If necessary, measures to compensate for impacts to features of nature conservation importance are also included;
- Any remaining (residual) impacts of the development are reported; and
- Whether there is scope for enhancement is also considered, even if there are no significant negative impacts. Opportunities to benefit nature conservation

interests exist without incurring excessive costs on the development are then proposed.

This assessment approach is further described below.

6.5.1 Evaluation of Receptor Importance to Nature Conservation

An ecological resource is defined as a species, site or area of nature conservation value. Each site or area may have more than one feature of value that it supports (for example different habitats or populations of species). The IEEM guidance assesses value in terms of the benefits that these features provide to people or society in general, and includes elements such as their contribution to biodiversity. Legal protection is considered separately from value. The values of features are described within a geographical frame of reference (e.g. the feature is of importance at a European level). To attain each level of value and / or importance, an ecological resource or one of the features should meet the criteria set out in Table 6.2 below. In some cases, professional judgement may be required to increase or decrease the allocation of specific value. This judgement is based on consideration of the following additional criteria:

- Population trends;
- Sustainability of resource;
- Representativeness;
- Potential for substitution/re-creation;
- Position in the ecological unit;
- Biodiversity; and/or
- Intrinsic value to stakeholders.

For example, the protection of a particular receptor through national or international legislation does not necessarily relate to the assessment of importance of that receptor to nature conservation. Thus, badgers are protected by national legislation for reasons of animal welfare, but if they are widespread and common in an area they may be of only local or regional conservation importance. Likewise, certain habitats may be important within a regional context, and may have been identified for priority action within the LBAP if this has been prepared for an area, but are not considered to be of national conservation importance. However, the evaluation should be based upon the amount and quality of that habitat type present on the site itself, rather than its presence per se. This ensures that small areas of poor-quality habitat are not over-valued.

Areas considered by SNH to be of national importance for nature conservation are designated as Sites of Special Scientific Interest (SSSI). There are also a range of international designations including Biosphere Reserves, Ramsar sites, Special Areas of Conservation (SAC) and Special Protection Areas (SPA). Wildlife areas of importance at the local level can be designated as non-statutory Sites of Local Nature Conservation Interest (SLNCI) or similar, or as Local Nature Reserves (LNR).

The criteria used to describe the resource value of ecological features for this study are set out in Table 6.2 and are based upon criteria identified in the IEEM guidance and previous Environmental Statements produced by Scott Wilson. To attain each level of value / sensitivity, an ecological feature must meet the criteria in at least one of the areas set out in Table 6.2, although as mentioned previously, in some cases, professional judgement may be required to increase or decrease the allocation of specific value as outlined in the table.

Table 6.2: Ecological Resource Value (IEEM, 2006) (continued over)

Nature Conservation Value (Sensitivity)	*Examples of Selection Criteria*
International **(Very High)**	**European Community and Wider Area** A site designated, or identified for designation at the international level e.g. World Heritage Sites, Special Protection Area (SPA), Special Area for Conservation (SAC), and / or Ramsar site. Proposed sites are also given the same consideration as designated sites; A sustainable area of any habitat 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 regularly occurring population of an internationally important species e.g. UK Red Data Book species, which is listed as occurring in 15 or fewer 10 km squares in the UK, and that is identified as of unfavourable conservation status in Europe or global conservation concern in the UK BAP.
UK/National **(High)**	**United Kingdom of Britain and Ireland / Scotland** A site protected by national designations e.g. Site of Special Scientific Interest (SSSI), National Nature Reserve (NNR), or Marine Nature Reserve or a site considered worthy or this designation; A sustainable area of any priority habitat identified in the UK BAP, or smaller areas of such habitat that are essential to maintain the viability of a larger whole; A feature identified as of critical importance in the UK BAP; Sustainable population of a nationally important species (species listed on Schedules 5 & 8 of the Wildlife and Countryside Act), which is threatened or rare in the county; Any regularly occurring population of a nationally important species that is threatened or rare in that region of the Country, and for which the LBAP identifies the need to protect all remaining sites.
Regional **(Medium)**	**Ayrshire** Areas of internationally or nationally important habitats that are degraded but are considered readily restored; Species/Habitat listed as priority in the UKBAP (not covered above); Viable areas of key habitat identified in the Ayrshire LBAP, or smaller areas of such habitat that are considered essential to maintain the viability; A site designated as a Wildlife Site or Site of Nature Conservation Interest (SNCI); A regularly occurring, locally significant number of a nationally important species.
Local **(Low)**	**Ward 23 - Tarbolton, Symington & Craigie** Areas of internationally or nationally important habitats that are degraded and have little or no potential for restoration; A good example of a common or widespread habitat in the local area.

Nature Conservation Value (Sensitivity)	Examples of Selection Criteria
Site (Negligible)	**Bogend Toll to Dutch House Roundabout** Common and widespread species; Areas of heavily managed or modified vegetation of low intrinsic interest and low value to species of nature conservation interest, that do not appreciably enrich the site or locally e.g. improved grassland, arable crops.

6.5.2 Method of Assessment of Effects

Identification of potential impacts of the Scheme has been based on a variety of approaches. The primary source of information has been the review of similar projects and professional experience of the assessment team. The method for assessing the effects follows the Guidelines for Ecological Impact Assessment in the United Kingdom (IEEM, 2006).

The effect of potential impacts depends upon:

- Magnitude: 'size' or 'amount' of impact, determined on a quantitative basis where possible, e.g. the numbers of a species that are influenced;
- Extent: The area over which the impact occurs;
- Duration: The time over which the impact is expected to last prior to recovery or replacement of the resource or feature;
- Reversibility: whether recovery is possible within a reasonable timescale; and
- Timing and Frequency: Whether impacts coincide with critical life changes or seasons (e.g. breeding bird season) and how frequent the impacts are likely to be.

These factors are further presented within Table 6.3 below:

Table 6.3: Factors that Determine Effect of Impact (IEEM, 2006) (continued over)

Environmental Parameter	Description
Magnitude	The 'size' or 'amount' of an impact is referred to as the magnitude of the impact, and is determined on a quantitative basis where possible.
Extent	The extent of an impact is the area over which the impact occurs. Habitats, could be considered to be an area, therefore the magnitude and extent of an impact may be synonymous.
Duration	The duration of an impact is the time over which an impact is expected to last prior to recovery or replacement of the resource or feature. This is considered in terms of life cycles of species and regeneration times of

Environmental Parameter	Description
	habitats. The duration of an impact may be longer than the duration of an activity. For example, construction activity may cause disturbance over 2 years but the impact from that disturbance may continue for 5 years.
Reversible	Reversible (or temporary) impacts are those from which a spontaneous recovery is possible, or for which effective mitigation is possible. Reversible impacts will arise during the construction phase of the Scheme. Irreversible (or permanent) impacts are those from which recovery is not possible within a reasonable timescale, or for which there is no reasonable chance of action being taken to reverse it. The effects of permanent landtake may lead to irreversible fragmentation of habitats. Some indirect effects may also be irreversible or of an unspecified duration, (e.g. the effect of noise pollution on breeding and roosting birds).
Timing and Frequency	Some activities or changes may only cause an impact if they coincide with critical life stages or seasons, therefore timing of the activity or change is important in assessing the impact. Such impacts may be avoided through careful timing of works. The frequency of an activity will influence the resulting impact.

Impacts on the ecology and nature conservation, and its social and economic values relating to the site can be divided into two main types: negative and positive (as defined in the IEEM Guidelines, 2006). These **negative** and **positive** impacts can be further sub-divided into those impacts that are **direct** and those that are **indirect**.

Impacts in combination may have a **cumulative effect** that is greater than when the same impacts act in isolation. Cumulative impacts may entail the assessment of all the effects of the Scheme upon a feature (e.g. impacts at the construction and operation stage), or the combined impacts of a number of schemes that will affect the same area.

The significance of the effect on the ecological integrity of the site depends upon all of these factors. The accepted definition of site integrity is 'the coherence of its ecological structure and function, across its whole area, that enables it to sustain that habitat, complex of habitats and/or the levels of populations of the species for which it was classified' (Scottish Executive, 2000).

The effect on ecological integrity of the site is either deemed to be significant or not significant. The terms ‘significant’ and ‘not significant’ are used as described in Table 6.4. Initially, consideration of the impact on ecological integrity does not take account of any recommendations for mitigation that might subsequently be described. Residual impacts and significance takes these mitigation measures into consideration.

Table 6.4: Description of the Terms "Significant" and "Non-significant"

Scale of impact upon ecological integrity	*Description*
Significant	The impact is significant if it is assessed to be large in scale or amount, irreversible, have a long-term effect, or coincide with critical life stages. In addition, a combination of any of these parameters will also be assessed as significant.
Not significant	The impact is not significant if it is assessed to be small in scale or amount, reversible within a reasonable timescale and does not coincide with critical life stages.

6.5.3 Confidence of Assessment and Data

It is valuable to attribute a level of confidence to the accuracy of a prediction. Four levels have been identified for the purposes of this study, as outlined in IEEM Guidelines (2006):

- Certain / near-certain: probability estimated at 95% chance or higher;
- Probable: probability estimated above 50% but below 95%;
- Unlikely: probability estimated at less than 50%; and
- Extremely unlikely: probability estimated at less than 5%.

Certain / near-certain confidence is assigned where the anticipated impact is very likely to occur, based on reliable information (e.g. formal surveys undertaken to a standard methodology) or previous experience. Unlikely level of confidence is assigned where the predicted impact and its level are best estimates, generally derived from first principles of ecological theory and the experience of the assessor. This category has also been used where there is limited information about species occurrence. The reason for including a confidence category of 'extremely unlikely' is that though some effects may be very improbable, they would have very serious implications should they occur.

Unless otherwise stated, all impacts are given at a certain / near-certain confidence level.

6.6 Baseline Conditions

The text relating badgers has been placed in a Confidential Annex to the ES. This Confidential Annex will only be made available to Transport Scotland and SNH. Badgers will not be mentioned further within this ES chapter.

6.6.1 Desk-based Information

A search of the NBN yielded no historic red squirrel (*Sciurus vulgaris*), water vole (*Arvicola terrestris*) or great crested newt (*Triturus cristatus*) records within the

study area. Otter records were returned from 1991 at Coodham Loch (NS394326) and at the Pow Burn below Langlands (NS381295).

Otter death records in the vicinity of the Scheme were provided by Jim & Rosemary Green, and are listed below.

Table 6.5: Road Death Casualties

Species	*Age/Sex*	*Grid Reference*	*Date*
Otter	Male adult	NS390315	October 1988
	Male adult	NS375276	January 1994
	Unknown adult	NS394320	October 1998
	Unknown adult	NS378299	November 1999
	Male adult	NS375298	November 2002

6.6.2 Statutory Designated Sites

There are no statutory sites of international, national ecological importance in or adjacent to the site area.

6.6.3 Non-Statutory Designated Sites

Non-statutory designated features are shown on Figure 6.1 Ecological Constraints Map.

There are several areas of Long-established Plantation, as defined in the SNH Ancient Woodland Inventory (AWI) Ancient Woodland within the study corridor. This is not a statutory designation, and refers to sites shown as plantation woodland in c.1860 but not shown in 1750 (Roy) maps. It highlights areas of potentially high value ecological habitat. Ancient Woodland Inventory sites are home to more threatened species than any other habitat in the UK and can also be of importance for preservation of archaeological features (www.woodland-trust.org.uk). If these sites are not designated as SSSIs, then they can be assessed as Regional value for natural heritage interest.

From south to north these are indicated below, with grid references indicating the nearest point to the A77 carriageway:

- Blackside Wood (NS365287), to the west of the A77;
- Crow Wood (NS369289), to the east of the A77;
- Rosemount (NS371292), to the east of the A77;
- Broad Tongue Wood (NS376299) to the west of the A77; and
- Coodham Woods (NS396323) to the west of the A77.

Trees within the Coodham Estate and around Symington are provided protection by the South Ayrshire Council through Tree Preservation Orders (TPO's). TPO's are generally applied to one or more trees, an area of trees or woodland. TPO's are used by Local Planning Authorities to protect selected trees and woodlands if their removal would have a significant impact on the local environment and it enjoyment by the public (IEEM, 2006).

SWT informed through their consultation response that the only Wildlife Site within the study area in the vicinity of the Scheme is Coodham Estate. This is designated in respect of woodland habitats.

The Pow Burn is a non-statutory site protected through South Ayrshire Councils Wildlife Strategy.

Many habitats and species throughout the study area, particularly those relating to farmland, will be priorities within the UK Biodiversity Action Plan (UKBAP) and Ayrshire Local Biodiversity Action Plan (LBAP).

South Ayrshire LBAP habitats relevant to the site are farmland habitats and the component parts: grassland, scrub, and arable land, wetlands, trees and woodland, farm buildings, and dry stone dykes. Priority species with Species Action Plans (SAP) are: black grouse (*Tetrao tetrix*), brown hare (*Lepus europeaus*), corncrake (*Crex crex),* hen harrier (*Circus cyaneus*), lesser whitethroat (*Slyvia curruca*), northern brown argus (*Aricia artaxerxes*), oyster plant (*Mertensia maritima*), pink meadowcap (*Hygrocybe calyptraeformis*), pipistrelle bat (*Pipistrellus pipistrellus*), song thrush (*Turdus philomelos*) and water vole (*Arvicola terrestris*).

6.6.4 Field Survey

Habitats

The Phase 1 habitat map for the surveys is shown in Figure 6.2, with the associated target notes listed in Appendix 6. These results are taken directly from Stage 2 report. Six main Phase 1 habitat categories were recorded within the survey area. These were:

Woodland & Scrub	Broad-leaved semi-natural woodland	A1.1.1
	Broad-leaved plantation woodland	A1.1.2
	Coniferous plantation woodland	A1.2.2
	Mixed plantation woodland	A1.3.2
	Dense/continuous scrub	A2.1
	Scattered scrub	A2.2
	Scattered trees - broadleaved	A3.1
	Scattered trees – conifer	A3.2
Grassland & Marsh	Unimproved neutral grassland	B2.1
	Semi-improved neutral grassland	B2.2
	Improved grassland	B4
	Poor semi-improved grassland	B6
Tall Herb & Fern	Tall ruderal	C3.1
Swamp		F1
Open Water	Standing water	G1
	Running water	G2
Miscellaneous	Arable	J1.1

Amenity grassland	J1.2
Species-rich hedge	J2.1.1
Species-poor hedge	J2.1.2
Fence	J2.4
Buildings	J3.6

Woodland & Scrub

Woodlands across the area are almost entirely of plantation origin, consisting for the most part of mixed conifer and broadleaved species planted for screening or shelter belt purposes, and largely non-native. Generally the ground/field layers within the plantation woodlands are of overall poor quality in terms of species cover and diversity. They do however provide some diversity of habitat type within a largely agricultural landscape.

Although the woodlands as a whole would appear to lack substantial native origins there are some parts of the longer-established woodlands which have retained or have developed a more natural structure, and contain ground flora indicative of those conditions. Species such as wood sorrel (*Oxalis acetosella*) and sanicle (*Sanicula europaea*) were recorded. Those particular woodlands tended to be linked to the estates at Rosemount and Coodham and are clearly part of long-established and managed woodland.

Species recorded within the woodlands include beech (*Fagus sylvatica* + *F. sylvatica 'purpurea'*), ash (*Fraxinus excelsior*), sycamore (*Acer pseudoplatanus*), birch (*Betula* sp(p)), oak (*Quercus* spp – including *Q. petraea, Q. robur, Q. cerris*), alder (*Alnus* sp(p)), horse chestnut (*Aesculus hippocastanum*), sweet chestnut (*Castanea sativa*), holly (*Ilex aquifolium*), rhododendron (*Rhododendron ponticum*), lime (*Tilia x europaeus*), elder (*Sambucus nigra*), willow (*Salix* spp.), rowan (*Sorbus aucuparia*), laurel (*Prunus* sp(p)), Scots pine (*Pinus sylvestris*), Norway spruce (*Picea abies*), sitka spruce (*P. sitchensis*), yew (*Taxus baccata*), Douglas fir (*Pseudotsuga menziesii*), larch (*Larix* sp(p)) and cypresses (*Cyperaceae* spp.).

Areas which maintain a mixed scrubby vegetation type tend to have been planted-up for management purposes, ie to provide cover for pheasant. This management regime has been carried into a number of the woodland strips where pheasant pens and feeders are distributed, and cuttings and brashings have been used to create dense cover for the birds.

Grasslands & Arable

The survey area consists primarily of improved agricultural land, used for grazing and for growing cereal crops. Some semi-improved grassland was mapped, which tended to occur in association with the old estates, former plant nurseries, land for grazing horses, cover and diversity for pheasants.

Very little unimproved grassland was recorded. It currently exists in areas either abandoned or in awkward situations for management purposes such as the roadside verges, and while unimproved grasslands are regarded as of higher value, these grasslands do not exhibit long-term development or species diversity.

Open Water

Several watercourses flow through or close to the survey area. Two named watercourses – the Pow Burn and the Dow's Burn - flow north to south on either side of the A77 (Pow Burn to the east of the A77 and the Dow's Burn to the west).

The Pow is the more significant of the two watercourses and forms a more recognisable riparian habitat corridor, and has been reported to contain brown trout (*Salmo trutta*) populations. It is, however, affected by the general management regime for the land in the area, with improved fields reaching Dow's to the edges of the watercourse allowing grazing, poaching and nutrient input.

The Dow's is more heavily vegetated, narrower and shallower. Several other unnamed watercourses either feed into the Pow or Dow's Burn's or into burns away from the survey area.

One small pond was noted close to the Rosemount estate. The pond had been constructed for the purposes of wildfowling (one of two previously dug out) but it has been left unmanaged over the past few years (*Pers. Comm*.).

Coodham Lake forms a major body of water within the survey area and has been part of the designed landscape of the former estate. The lake has a fringe of marginal and emergent vegetation, principally dominated by reed sweet grass (*Glyceria maxima*) and provides suitable habitat for a range of water birds. The former estate is currently being developed for luxury housing, with the old house being renovated and turned into a number of individual flats and houses. Part of the development programme involves de-silting the lake and constructing a track/path around the margins (on-going at the time of survey).

Hedgerows

Hedgerows within the survey area consist more-or-less of two types. They are either species poor hedges dominated by hawthorn (*Crateagus monogyna*), sometimes solid and maintained or full of gaps, leggy, and untrimmed, or they are more species rich, with hawthorn, ash (*Fraxinus excelsior*), rose (*Rosa* sp.), elder (*Sambucus nigra*), apple (*Malus* sp.), bramble (*Rubus fruticosus*). The richer hedgerows tend to be fuller; either cut or untrimmed and are mainly found lining roadsides and drives.

Flora

Plant species along the corridor do not hold any rare or notable status.

Invasive Species

Japanese knotweed (*Fallopia japonica*) is present at Coodham Estate, particularly on the fringes of Coodham Lake and within the walled garden of the estate. This is an aggressive, non-native species listed on Schedule 9 of the Wildlife & Countryside Act 1981, and it is an offence to introduce it or cause it to spread in the wild. It will not be impacted by the road improvement works and it not discussed further within this ES. However should any works be proposed for within the Coodham Estate, this issue will need to be taken into consideration.

Requirement for National Vegetation Classification (NVC) Surveys

SNH requested within their consultation response (John Collie, SNH, 31st August 2006) that an NVC survey be carried out on any recognised areas of higher biodiversity value within the 1km corridor. However, based on the Phase 1 habitat results, no such areas were identified, and therefore an NVC survey was not deemed appropriate.

Breeding Birds

Table 6.5 below shows the species that were recorded during the breeding bird survey. Status refers to a species' listing on the EC Birds Directive Annex 1, Wildlife & Countryside Act Schedule 1, Red Data Book, UKBAP, LBAP, or RSPB Red and Amber lists.

EU Birds Directive, Annex 1

The Directive aims to deliver protection, management and control of all species of wild birds where they occur naturally. Member states are required to take steps to maintain populations at levels at which they are sustainable both ecologically and scientifically. For particular species a member state must designate Special Protection Areas (SPAs) of suitable habitat. An Annex 1 species is listed for reason of danger of extinction, vulnerability to specific habitat changes, rarity either by population size or restricted local distribution, or other specific habitat requirements.

Wildlife and Countryside Act (WCA) 1981, Schedule 1

Schedule 1 birds are priority species on which special penalties apply to infringement of the act either against the bird, its nest or eggs. Generally under the Act all wild birds, their nests and eggs are protected.

Red Data Books

A species is listed as either a Red Data species or candidate Red Data species for the following reasons (Batten *et al,* 1990):

- Breeding in the UK in internationally significant numbers (BI)
- Non-breeding in internationally significant numbers (WI)
- Rare breeder (BR)
- Declining breeder (BD)
- Localised breeder (BL)
- Localised non-breeder (WL)
- Showing cause for concern or declining numbers (SC)

Joint Nature Conservation Committee (JNCC)

The JNCC publish a list of Birds of Conservation Concern (JNCC, 2002). Red-listed species are generally those whose breeding population or range is declining

or that are globally threatened. Amber-listed species are those whose breeding or non-breeding populations are in moderate decline, they are internationally important and localised breeding or non-breeding species, or they hold an unfavourable conservation status in Europe. For both status codes a species can be coded because of the percentage of breeding pairs of the international population found in the UK.

UKBAP

Species and habitats on the UKBAP have priorities and actions set out through Habitat and Species Action Plans, which direct statutory organisations and public bodies to promote their protection and increase biodiversity. Part of this process is setting targets at local levels through LBAP's.

LBAP

Birds on the LBAP have been selected by SAC and their partners as being of value in the local context of Ayrshire, and best reflect current trends in the populations of valued species.

Table 6.5 Breeding Bird Survey Results (continued over)

Common Name	Scientific Name	Conservation Status	Estimated Breeding Pairs	
			East of A77	West of A77
Blackbird	*Turdus merula*	Amber	14	13
Blue Tit	*Parus caeruleus*		4	6
Buzzard	*Buteo buteo*	CRDB, cRDB	1	0
Carrion Crow	*Corvus corone corone*		0	2
Chaffinch	*Fringilla coelebs*		18	20
Chiffchaff	*Phylloscopus collybita*		1	0
Collared Dove	*Streptopelia decaocto*		0	2
Dunnock	*Prunella modularis*	Amber	2	1
Feral Pigeon	*Columba* sp		6	0
Goldcrest*	*Regulus regulus*	Amber	1	
Goldfinch	*Carduelis carduelis*		2	2
Great Tit	*Parus major*	LBAP/ks	2	3
Greenfinch	*Carduelis chloris*		3	2

Common Name	Scientific Name	Conservation Status	Estimated Breeding Pairs	
Herring Gull	*Larus argentatus*	Amber	Foraging Only	
House Martin	*Delichon urbica*	Amber, LBAP/ks	20	20
House Sparrow	*Passer domesticus*	Red	3	0
Jackdaw	*Corvus monedula*		20	20
Kestrel	*Falco tinnunculus*	Amber	0	1
Lapwing	*Vanellus vanellus*	Amber	Foraging only	
Linnet	*Carduelis cannabina*	Red, UKBAP, LBAP/ks	0	1
Long Tailed Tit	*Aegithalos caudatus*		1	0
Magpie	*Pica pica*		1	0
Mallard	*Anas platyrhyncos*		1	0
Mistle Thrush	*Turdus viscivorus*	Amber	0	1
Moorhen	*Gallinula chloropus*		1	1
Pheasant	*Phasianus colchicus*		2	1
Reed Bunting	*Emberiza schoeniclus*	Red, UKBAP, LBAP/ks	1	0
Robin	*Erithacus rubecula*		9	20
Rook*	*Corvus frugilegus*		30+	1 plus Coodham
Sedge Warbler	*Acrocephalus schoenobinus*	LBAP/ks	0	1
Song Thrush	*Turdus philomelos*	Red, UKBAP, LBAP/ap	2	2
Starling*	*Sturnus vulgaris*	Amber	26	26
Stock Dove	*Columba oenas*	Amber	0	0
Swallow*	*Hirundo rustica*	Amber, LBAP/ks	20	20
Swift	*Apus apus*		Nos breeding are unknown	

Common Name	Scientific Name	Conservation Status	Estimated Breeding Pairs	
Willow Warbler	*Phylloscopus trochilus*	Amber	9	6
Whitethroat	*Sylvia communis*	LBAP/ks	1	1
Wood Pigeon	*Columba palumbus*		4	15
Wren	*Troglodytes troglodytes*		13	15
Yellowhammer	*Emberiza citrinella*	Red, UKBAP, LBAP/ks	2	6

*Key: * - these species are difficult to census and numbers are rough estimates only; UKBAP- UK Biodiversity Action Plan Priority Species, LBAP/sap - Local Biodiversity Action Plan Priority Species with a Species Action Plan, LBAP/ks – LBAP Key Species for a Priority Habitat; Red & Amber - Birds of Conservation Concern Red or Amber; RDB – Red Data Book.*

A rookery (species: *Corvus frugilegus*) is established within the woodland at Rosemount and is recorded as part of the national rookery census. At the time of survey the rookery held approximately 40 nests.

A further rookery of approximately 95 nests and a smaller colony of 12 nests was recorded at Hansel Village, spread over the area in the pine and spruce trees – grid reference NS 38024 30258.

Another rookery is established in the woodland on either side of the main entrance into Coodham Estate (southeast corner).

Areas of particularly high activity were recorded at:

- The nursery west of the A77 on the B730;
- The strip of trees off Brewlands Road in Symington; and
- The south edge of Hansel Village.

Several of the species recorded above have a priority conservation status. In general this relates to the national and international populations as opposed to the local population. All of the species recorded as Red or Amber are not uncommon in Ayrshire, and those with an LBAP status are either the song thrush (national priority species), or Key Species for particular habitats, ie common to that habitat and representative of that habitat.

For most of the species recorded the incidence of breeding pairs is not high. This reflects the agricultural nature of the corridor. Figure 6.3, which illustrates the survey results, clearly shows birds present primarily at woodland pockets and along field boundary features where hedgerows and tree lines are present.

Otters

During walkover surveys three old spraints were found on the Pow Burn (NS3829029705) next to a mink scat, northeast of Pow Bridge.

The low level of activity is unusual given the distribution of otters over Scotland's catchments, the burn's proximity to the sea, and the presence of a large waterbody such as Coodham Lake. However, there were no incidental sightings of fish along the Pow Burn, which may be associated with this lack of activity. However desk-based information has yielded a number of relatively recent otter deaths along the A77 and there are records of otter activity from Coodham Loch and the Pow Burn from 1991 (SNH NBN database, 2006).

Water Voles

No evidence for the presence of water voles was found along any watercourse. A mink was recorded swimming in the Pow Burn north of Rosemount in Autumn 2005, and signs of mink (scats) were recorded on the Pow again in 2006. Mink are a significant predator of water voles and can lead to their eradication in an area. Many parts of the watercourses are poached and unsuitable for water voles, however there is some availability of habitat of suitability for water voles within the study area, particularly along the Pow Burn as indicated in target Note 51.

Bats

First Survey

Four species of bat were recorded during the initial surveys in October 2005. Common and soprano pipistrelles (*Pipistrellus pipistrellus, P. pygmaeus*), brown long-eared (*Plecotis auritus*), and daubenton's bat (*Myotis daubentonii*) were recorded throughout the study area. A summary of the results of the initial survey carried out in are summarised in Table 6.6 below. The full A77 Symington and Bogend Toll Bat Survey Report is provided in Appendix 7.

Table 6.6: Summary of Bat Foraging Activity (continued over)

Location	Species	Activity
Monkton to Low Wexford Farm	*P. pipistrellus* *P. pygmaeus*	Bats recorded in low numbers moving in the direction of Southwoods Road. Recorded along edges of Blackside Wood, using social calls indicative of potential breeding behaviour.
Rosemount Estate	*P. pygmaeus*	Recorded feeding throughout the area, but no roosts located.
Hansel Village and Symington	*P. pygmaeus*	Eight passes recorded around Hansel Village. High level of activity around Symington Village and several buildings identified as being suitable roosting sites, but no roosts identified.

Location	Species	Activity
Between Symington and Coodham Estate	*P. pygmaeus, Plecotus auritus, Myotis daubentonii*	Most of the bat activity was centred in the vicinity of the Coodham Estate where three bat species were recorded. Three species of bat were recorded around Coodham Estate. Soprano pipistrelles were recorded throughout the site, but in low numbers. A few daubenton's bat passes were recorded over Coodham Lake. Brown long eared bats were visually recorded, gleaning insects from the vegetation around Coodham Lake.

No actual or potential roosts of any bat species were found during the initial surveys. The Pow Bridge was found to contain no crevices deep enough for bats to roost in, and no droppings or other signs of bats were recorded, it has been pointed and the watercourse is too narrow.

The level of bat activity in the survey corridor was lower than would be expected during the summer months as maternity roosts have dispersed by October and bats are in smaller transitional roosts.

Second Survey

The subsequent detailed bat survey was carried out on 14th September 2006. Day surveys focussed on the Brocket Link Road area, Hansel Village, Stockbridge, Jeanfield, Trynlaw, Whiteness and Coodham Estate. The main areas of interest are listed below:

- 1 - Hansel Village: Two large ivy-covered trees (NS37842.30636). No signs of roosts, but ivy-clad trees may be used as temporary/transitional roosts. No impacts anticipated.
- 2 - Trynlaw northwest: Hawthorn hedge with parallel line of birch trees, c. 30yrs old, (NS38416.31450), some with very large rot holes. Unlikely to be in the direct line of the proposed route. No signs of roosts, but ivy-clad trees may be used as temporary/transitional roosts.
- 3 - Trynlaw north: Strip broadleaved woodland to rear of houses at Trynlaw, some mature ivy-clad trees (NS38486.31507), located in the direct line of the proposed route. No signs of roosts, but visibility poor to top of canopy, but ivy-clad trees may be used as temporary/transitional roosts.
- 4 - Trynlaw northeast: Mature ash along hawthorn hedgerow extending eastwards, c.0.75 diameter (NS38581.31619), with a large rot hole suitable for roosting bats, and a small amount of ivy. Will not be in the direct line of the proposed route. No bat signs evident.
- 5 - Trynlaw east: Ash tree (NS38628.31734), c.30-40yrs old, with longitudinal crack suitable for use as a temporary roost site for bats, though no signs evident. Will not be in the direct line of the proposed route.
- 6 - Whitelees: To the rear of Whitelees there is a very large, c.1m diameter sycamore tree (NS39199.32203), but no suitable cracks were visible within the

canopy, though they may be obscured by foliage. Will not be in the direct line of the proposed route.

- 7 - Rosemount: Immature elder tree, within mixed woodland to the rear of North Lodge (NS371292), with a large longitudinal crack, suitable for bat roosting. No impacts anticipated.
- 8 - Brocket: Within woodland the rear of Brocket there is a very large, c.1m diameter poplar tree (*Populus* sp.) (NS370289), but no suitable cracks were visible within the canopy, though they may be obscured by foliage. No impacts anticipated.

Based on this survey, it is evident that there is minimal bat roost potential within the direct impact area and a precautionary approach towards tree felling will be advocated within the mitigation sections. However, to investigate the potential for bat roosts within the area, a bat detector survey was carried out in the vicinity of Trynlaw and Hansel Village at locations anticipated to be directly impacted by tree felling. Sunset on 14th September 2006 was at 19.49 (BST), therefore surveys were carried out between 19.20 and 21.49. Foraging soprano pipistrelles were located at both sites, with no evidence of emergence from potential tree roosting sites.

Other Incidental Records

Field voles (*Microtus agrestis*), rabbits (*Oryctolagus cuniculus*), roe deer (*Capreolus capreolus*), fox (*Vulpes vulpes*), and grey squirrel (*Sciurus carolinensis*) were all recorded during the various survey events. Brown hares (*Lepus europaeus*) were recorded feeding in fields on both sides of the road during May and June. The brown hare has a Species Action Plan within the South Ayrshire Local Biodiversity Action Plan. No evidence for the presence of amphibians was found within the impact zone. Small built ponds occur at Rosemount and Coodham Estate, but these are either dry or will not be impacted by road improvements.

6.6.5 Value of Ecological Resources

This section evaluates the nature conservation interest of the study area in terms of the habitats and the species it supports. This value is placed in a geographical context through the framework shown in the Assessment Methodology section, based on relevant legislation and guidance. This evaluation is shown in Table 6.7.

Table 6.7 – Value of Ecological Resources (continued over)

ECOLOGICAL RECEPTOR (habitat/species)	***STATUS***
Ancient Woodland Inventory Plantations	Woodland at Broad Tongue Wood, Rosemount, and the Coodham Estate is listed on the SNH woodland inventory as 'long-established woodland of plantation origin'. This habitat is widespread throughout the South Ayrshire area, and has therefore been assessed as of **Regional** importance.
Pow Burn - Local Wildlife Strategy Site	This watercourse is highly modified within minimal natural riparian vegetation and there are several other watercourses

ECOLOGICAL RECEPTOR (habitat/species)	STATUS
	in the wider area. However it does provide otter habitat and brown trout (*Salmo trutta*) have been reported, and it provides potential habitat for water voles and has therefore been assessed as of **Regional** importance.
Coodham Estate Wildlife Site	The Coodham Estate is categorised by SWT as a Listed Wildlife Site. The woodland and lake habitats contained within the Coodham Estate are widespread throughout the South Ayrshire area, and it has therefore been assessed as of **Regional** importance.
Tree Preservation Orders	Woodland at the Coodham Estate and Symington is protected via the South Ayrshire Council through TPO's. This habitat is widespread throughout the South Ayrshire area, and is unlikely to be directly impacted by the Scheme, and has therefore been assessed as of **Regional** importance.
Habitats	The habitats within the area of concern are generally species-poor, are of limited ecological value, and are widespread in their distribution throughout the UK and local area. Many of the habitats are listed on the Ayrshire LBAP, e.g. farmland, grassland and woodland and are assessed as of **Local** importance. The remaining habitats are classed as **Site** importance.
Breeding Birds	Reed bunting, skylark, linnet, reed bunting and song thrush are UKBAP species and are therefore assessed as being of **Regional** importance. Great tit, house martin, linnet, reed bunting, sedge warbler, swallow, whitethroat and yellowhammer are key species for priority habitats on the LBAP. These bird species and the remaining widespread and common bird species within the study area are and are assessed as being of **Local** value.
Otters	Otters receive protection under the Conservation Regulations 1994 and the Wildlife and Countryside Act 1981. They are also a priority species under the UKBAP and also the Ayrshire LBAP. There are widespread and recovering populations throughout Scotland, and outside of areas where they are designated as notified feature of SAC sites, they are assessed as **Regional** importance.

ECOLOGICAL RECEPTOR (habitat/species)	STATUS
Water Voles	Water voles have suffered a long-term decline since 1900, with accelerated loss through the 1980s and 1990s, with predictions of a 94% loss of water voles from former sites by the year 2000 (Strachan, 1998). They are also a priority species under the UKBAP and also on the Ayrshire LBAP. While water voles are not present on site, suitable habitat is available and it is anticipated that there may be available source populations in the wider area. Water voles have therefore been assessed as **Regional** importance.
Bats	Of the 16 species of UK bat, nine regularly occur in Scotland and are protected under The Conservation Regulations (Natural Habitats &c.) 1994 and the Wildlife and Countryside Act 1981. Pipistrelle bats are also a priority species under the UKBAP and also the Ayrshire LBAP. As the two species of pipistrelle are common throughout Scotland and no roosts are present within the impact zone, they are assessed as **Regional** importance.

6.6.6 Predicted Trends in the Absence of Development

It is likely that the Scheme area would remain unchanged in the absence of development, apart from the Coodham Estate, which is currently undergoing renovation.

6.6.7 Limitations

No information gaps affecting the assessment of the potential effects of the Scheme have been identified. No access to private properties was possible, therefore bat roosts checks were not possible and no bat roosts have been identified.

6.7 Environmental Effects

6.7.1 Introduction

The Scheme proposals are outlined in Chapter 2. These activities might have a range of effects (both positive and negative) upon ecological features at either the construction or operation phases. A distinction is often made between direct and indirect impacts. Direct impacts occur where the changes to an ecological feature are directly attributable to an action associated with the Scheme, such as the loss of woodland for the construction of new buildings. Indirect habitats usually arise as a 'knock-on' effect of a scheme, and would include aspects such as disturbance of otter activity as a result of a change in human use of the site.

Direct and indirect effects can be further sub-divided into temporary or permanent impacts. Permanent impacts include loss of land to the Scheme. Temporary impacts arise during the construction phase (e.g. temporary use of land for storage

of materials), and whilst short in duration may potentially have longer-lasting effects. For example, temporary loss of habitats of high nature conservation value can be as of great a magnitude as the permanent land take of lower value habitats due to the timescales over which recovery occurs (e.g. the time taken to re-establish woodland). Effects may be cumulative, if, for example, the construction of the surface water treatment works and any adjacent developments were to both cause disturbance to the same ecological receptor.

6.7.2 Potential Effects

The impacts of the potential effects arising from the proposed Scheme are outlined below for the operational and construction phases, following consideration of the baseline conditions.

6.7.3 Effects of Site Construction

Site construction will involve site clearance (also referred to as enablement), physical removal of soils and vegetation, break-up of hard-standing and the introduction of artificial construction materials, active machinery and introduction of plant species as part of the landscape design. It is estimated that the works will take approximately 1 year scheduled between Summer 2008-09.

The potential negative ecological effects impacts involved with the construction of the new road scheme may potentially involve:

- Habitat loss (land-take), a direct and permanent effect: The severity of this effect is directly related to the amount of habitat lost and the conservation value of that habitat;
- Habitat fragmentation, a direct effect: Severance of habitats and/or the wildlife corridors linking them is also considered a direct impact. Fragmentation can lead to reduced genetic diversity and increase the likelihood of species being lost;
- Indirect effects: These arise from disturbance (visual, lighting, noise or vibration), dust deposition, increased vehicle trafficking and changes in patterns of existing drainage. These impacts have the potential to affect habitats outside the boundary of the construction site;
- Spread of alien invasive species: Construction traffic could result in fragments of invasive species, such as Japanese knotweed being spread around the Scheme area, leading to the new establishment of this alien species. This would be a permanent direct impact; and/or
- Possible pollution incidents:
  - Release of oils, fuels, chemicals etc. into the watercourses from construction machinery, stockpiles and apparatus; and/or
  - Release of soils, sediments etc from partially constructed embankments or other construction areas;

Non-statutory Designated Sites

At present there are no plans for encroachment upon the Coodham Estate Wildlife Site, and no tree felling within the Estate boundary to accommodate the proposed roundabout, therefore no TPO's are anticipated to be affected. Should these plans change, these issues will need to be taken into consideration.

There are no plans for long established woodland of plantation origin to be affected as part of this Scheme.

Habitats

All habitats are classified as being of site/local importance. The impacts on habitats can be divided into direct and indirect impacts.

Direct Impacts

Proposals will necessitate the felling of trees both in groups and as individuals, scrub clearance, severance hedgerows and encroachment upon grassland habitats and potential impacts upon open water:

- Woodland and trees: A direct impact on a body of woodland would cause fragmentation and affect the wildlife corridor function. It may also have negative impacts on European Protected Species such as bats that are using the woodlands for forage and potentially for roosting. Woodland at Trynlaw will be severed to accommodate Trynlaw Link Road. However, this will be used as a local access road, and should not hinder habitat connectivity to a great degree;
- Dense and Scattered scrub: Scrub habitats have considerable value as shelter, breeding and foraging habitat for a range of bird species, invertebrates, small mammals, and occasionally larger mammals such as badger, roe deer and fox. This value is more usually associated with dense scrub, which at the site is very limited, occurring only at Bogend Toll. The scattered nature of the scrub elsewhere lowers its value but it does provide some roosting and foraging opportunity particularly for bird species. Scrub will be removed to accommodate new junction alignments, but the impacts will be minimal (and can be compensated for - see mitigation section below);
- Hedgerows: The hedgerows along with woodlands and groups of mature trees are important in terms of habitat connectivity, wildlife corridors, and in some cases species diversity. Some are species poor and are principally dominated by hawthorn and others are species rich with a mix of species. It is likely that both species rich and species poor hedgerows will be affected, which will result in the fragmentation of the habitat. Hedgerows at Jeanfield will be severed for local access routes only;
- Grassland and Marsh: The Scheme proposals involve direct impact on the grassland by removal of small areas along the corridor. The greatest proportion is improved grassland of low conservation value. While the road verges can be relatively richer in diversity, the verges in this area are variable, and by their nature are also limited in their extent. The grasslands can be replaced with ease as part of the road improvement (see mitigation section below).

Direct impacts on the terrestrial habitats are considered not significantly negative at the local level and certain to happen.

- Open Water: No direct disruption to the banksides of the Pow Burn or Dow's Burn is anticipated. There is the slight possibility that some minimal direct impacts may occur through contamination of these watercourses, which could have negative impacts on the river vegetation, fish, invertebrates, and consequently the other faunal species such as otter that depend on the river. Effects could also be carried several kilometres downstream. These habitats are highly modified and impacts anticipated as minimal and short term.

Direct impacts on open water habitats are considered not significantly negative at the local level and unlikely to happen.

Indirect Impacts

The main issues could be dust deposition and the potential for contamination of watercourses and adjacent habitats either by run-off or through ground water.

Dust deposition will arise from site enablement and construction phases. The effects are primarily that vegetation, coated with dust, suffers drought stress. The effects of wind can carry the dust over a greater area. At this site it is considered unlikely that levels of dust or its transportation will significantly affect adjacent vegetation, provided that appropriate management procedures are put in place and Pollution Prevention Guidelines followed (ie PPG 1, PPG 5, PPG 6).

These indirect impacts are anticipated to be not significantly and negative at the local level and unlikely to happen.

Breeding Birds

Direct Impact

It is anticipated that all vegetation removal works would be undertaken outwith the breeding bird season.

Outwith the breeding bird season: direct impacts would relate to removal of foraging habitat in general and disturbance to birds in the vicinity. Removal of habitat alters the availability of forage and roosting and may decrease the attractiveness of an area to birds, potentially creating changes in the population dynamics of an area. A significant territorial and forage resource is still available in adjacent areas and areas not directly impacted by the road improvements. Given the availability of comparable habitat in the wider area and minimal land-take required, **impacts are anticipated to be not significantly negative at the regional/local level and unlikely to occur**.

Indirect Impacts

Bird species will be potentially indirectly impacted by noise, lighting and visual disturbance of the site during construction. However, a significant consideration is the fact that the A77 currently operates through this corridor, and birds adjacent to it will already be acclimatised to heavy traffic disturbance. Further, breeding species will tend to occur in higher numbers within woodlands and through intact

hedgerows. Notwithstanding the direct impact of scrub and individual tree removal, during construction there will likely be a tendency for some species to avoid close proximity to the new construction area and any woodland edges or hedgerows near to that area.

Should works be carried out outwith the breeding bird season, birds may choose to forage/roost further from the construction activity area. Once construction is complete it must be assumed that birds currently present along the A77 corridor will re-acclimatise. **This would be considered a not significantly negative impact at the regional/local level and likely to happen.**

Otters

Direct Impacts

At the time of survey, otter signs were evident along the Pow Burn but there was no evidence of couch/holt areas within the study area, and no clear signs of road crossing points. However there are several records of otter road deaths (shown on Figure 6.1), which indicate that otters have crossed the road at various locations, particularly at Broad Tongue Wood and Whitelees (Figure 6.1).

It is not anticipated that there will be any direct impacts on otters provided that the Pow Burn remains unaffected. There are no proposals for works in the vicinity of the Dow's Burn. As most otter movement is nocturnal, though they are generally deemed to be crepuscular, the likelihood of road casualties related to construction vehicles is assessed as 'extremely unlikely'. **The direct impacts on the otters themselves or their rest areas due to construction activity is anticipated to be not significantly negative at the regional level and extremely unlikely to happen**. This is based on the caveat that there is no further evidence of otters found along the watercourses in the vicinity of works as a result of pre-construction checks (see mitigation section).

Indirect Impacts

There is the potential for disturbance to otters due to construction activity.

There will be a considerable increase in vehicle movements as construction-related vehicles, which could increase the potential for road kill incidents. Although the survey results indicate that otters do currently move along the Pow Burn infrequently, the location of any temporary construction compounds in close proximity to the watercourse could lead to a disturbance effect upon any otters moving in the area. This could arise as a result of human activity, vehicle movements, noise and lighting from the compounds. **The disturbance impacts upon otters are therefore considered to be not significantly negative at the regional level and extremely unlikely to happen.**

Water Vole

No signs of water vole activity or burrows were observed within the watercourses in the study area. **Impacts are anticipated to be not significantly negative at the regional level and extremely unlikely to occur.** This is based on the caveat that there is no further evidence of water voles found along the Dow's Burn and Pow Burn in the vicinity of works as a result of pre-construction checks.

Bats

Direct Impacts

Direct impacts on bats will relate to potential removal of roost sites and foraging areas, particularly along hedgerows and woodland. At the time of survey time no roosts were found, but old trees with suitable cracks/icy matrices were located at Trynlaw, which may be felled. It is not expected that bats are highly likely to be present in the trees, but in the worst case scenario, should bat roosts be present in these trees at the time of construction **the impacts will be significantly negative at the regional level, and likely to happen.**

Loss of bat forage relates mainly to woodland edge and hedgerows, but the extent that is likely to be lost is considered not significant such that it would negatively impact the local bat populations. The greatest amount of bat activity was found at Coodham Estate, which will not be impacted. The new roads are likely to only require minimal amount of removal of suitable bats habitat. **The severance of hedgerows and removal of scrub/vegetation along the rest of the site is considered to be not significantly negative at the regional level and likely to happen.**

Indirect Impacts

Bats may be disturbed by the noise, lighting, vibration and presence of people and machinery during the construction phase. However, as with birds, the bats in this area are presently acclimatised to the noise of the A77 and the activity of local residents. **It is considered that the negative impact on bats of works to the existing road line or future traffic on any new road line is not significantly, negative at the regional level, and extremely unlikely to happen.**

6.7.4 Effects of Operation

The potential negative ecological effects impacts involved with the operation of the new road scheme may potentially involve:

- Noise due to traffic acting on sensitive species (e.g. sensitive waterfowl, badgers, otters);
- Water quality impacts due to contaminated run-off;
- Air quality impacts due to increased traffic movements along the A77;
- Introduction of new lighting and road signage could disturb sensitive species; and/or
- Increased risk of road mortality to badger, otter and birds due to faster moving traffic.

Non-statutory designated sites

It is not expected that any changes to the long established woodland of plantation origin are likely following the completion of the construction activity. There should be no operational impacts upon TPO's or Coodham Estate Wildlife Site. **The impact upon the non-statutory designated sites during the operational phase**

of the Scheme is assessed as not significantly at the regional level and unlikely to occur.

Habitats

It is not expected that any further changes to the terrestrial habitats are likely following the completion of the construction activity, and the associated habitat loss outlined above. **The impact upon the terrestrial habitats during the operational phase of the Scheme is assessed as not significantly at the site/local level and extremely unlikely to occur**.

There may be potential negative impacts during the operational phase related to potentially pollutant-laden run-off entering land drains, and subsequently flowing in watercourses such as the Dow's Burn and Pow Burn. **The impact upon the water habitats during the operational phase of the Scheme is assessed as not significantly at the local level and unlikely to occur**.

Breeding Birds

Birds in this area are presently acclimatised to the noise of the A77 and the activity of local residents, and it is not considered that there will be a substantial increase in impacts during the operation of the Scheme. **It is considered that the negative impact on birds of works to the existing road line or future traffic on any new road line is not significantly, negative at the regional level, and extremely unlikely to happen.**

Otter

It would appear that otters presently cross the A77 infrequently and use the Pow Burn as a foraging resource. They may also use other watercourses throughout the study area. There is a slightly increased risk of road mortality due to otters crossing the new junctions/access roads, however these are access roads and traffic should be travelling relatively slowly, so avoidance of impact may be possible in the majority of instances. **Therefore, impacts are anticipated to be not significantly at the regional level and extremely unlikely to occur**.

Water Vole

No signs of water vole activity or burrows were observed within the watercourses in the study area. Further, no suitable habitat for water voles will be affected by operational phase the proposed Scheme. **Therefore, impacts are anticipated to be not significantly at the regional level and extremely unlikely to occur**.

Bats

Bats in this area are presently acclimatised to the noise of the A77 and the activity of local residents, and it is not considered that there will be a substantial increase in impacts during the operation of the Scheme. **It is considered that the negative impact on bats of works to the existing road line or future traffic on any new road line is not significantly, negative at the regional level, and extremely unlikely to happen**.

6.7.5 Summary of Significance of Environmental Effect

A summary of the potential sources of impact is set out in Table 6.8 at the end of this chapter. These have been divided into two categories, those impacts occurring during construction, and those occurring during operation of the proposed Scheme. The significance of the identified impacts is also set out in the table. This is based on the criteria highlighted in Tables 6.1-6.3.

6.8 Mitigation and Monitoring

6.8.1 Introduction

This section provides a summary of the principles of mitigation considered during the preparation of proposals, and the legal requirements associated with the ecological features of the site. It also highlights mitigation measures necessary to reduce any negative effects upon ecological receptors, identified in the previous sections.

6.8.2 Principles of Mitigation

The principles of mitigation applied here, in order of priority are as follows:

- Avoid any negative impact on the target habitat or species.
- Minimise impacts by input into the Scheme design.

If this is not possible, then:

- Minimise the scale and magnitude of the impact, and then;
- Compensate for the impact through provision of alternatives.

Environmental mitigations have been incorporated at the design stage of the Scheme to ensure that:

- Sensitive habitats are identified and avoided where possible during development;
- Works are designed to avoid harm to protected species, including the choice of construction method;
- Works are timed to avoid the periods of maximum sensitivity of receptors; and
- Pollution incidents are avoided.

In the following sections, the extent of mitigation will be assessed as follows:

- Fully - impact fully mitigated, no residual effects predicted;
- Substantially - impact substantially mitigated, some residual effects possible; or
- Partially - impact partially mitigated, some residual effects predicted;

A Scheme Ecologist will be employed for the duration of the Scheme, henceforth referred to “Ecological Clerk of Works”. The Ecological Clerk of Works would be an experienced ecologist, retained (on a part-time or ad-hoc basis) during construction work to deal with any protected species or other ecological issues that may arise.

They would liase with relevant specialists and SNH to provide mitigation as necessary.

The Ecological Clerk of Works will be responsible for "Toolbox talks", whereby all site workers would be briefed on the ecological sensitivity of the site, and would have clear notification of protected species and restricted areas. These briefing meeting would be carried out on a regular basis. The Ecological Clerk of Works will also be responsible for the implementation of mitigation measures. This individual will also undertake pre-construction checks for otters, water vole and badgers where instructed in following sections (see Confidential Badger Annex).

6.8.3 Legal Requirements

Introduction

In addition to the general legal requirements that planners must consider in regard to potential environmental impacts of proposed activities or developments, certain habitats and species are afforded specific protection under European and National legislation. Several European Directives and conventions have been implemented using national legislation. Protected species in the UK are most usually covered by Schedule 5 of the Wildlife and Countryside Act (1981) (WCA), which makes it an offence to intentionally kill, injure, or take the animal, or to damage, destroy or obstruct access to its resting place, and Schedule 6 which covers animals (other than birds) that may not be killed or taken by specific methods. The WCA is the national legislation by which Scotland, England and Wales implement the Bern Convention (The Convention on the Conservation of European Wildlife and Natural Habitats).

Most protected species in Scotland are also protected by Schedule 2 of the Conservation (Natural Habitats &c.) Regulations 1994 (CNH) which is the legislation by which the UK implements the European Habitats and Birds Directives. The Nature Conservation Act (2004) recently introduced into Scotland also amends some of the WCA to afford wildlife a greater degree of protection.

The legislative requirements associated with the protected habitats and species along the A77, and the implications of these for development are considered below.

Non-statutory Designated Sites

Legislative Framework

Much of the woodland within the Coodham Estate has been protected through Tree Preservation Orders (TPO), which are operated by the local authority (see Chapter 14). In addition, the Coodham Estate is designated as a Wildlife Site by SWT. The Pow Burn is a non-statutory site protected through South Ayrshire Councils Wildlife Strategy. There are several areas of Long Established Woodland of Plantation Origin, as designated by SNH.

Mitigation

While no impacts are anticipated, all site staff should be made aware of the location of TPO's, the Coodham Estate Listed Wildlife Site and all areas of long established woodland of plantation origin, and the Pow Burn. At present there are no plans for

works directly affecting these sites but if this were to change, works will need to be discussed further.

Habitats

Legislative Framework

The habitats present within the study boundary are not subject to specific legal protection but are deemed to be of local importance.

Mitigation

Mitigation measures suggested to protect the terrestrial habitats and watercourses on site are:

- Direct habitat loss will be minimised where this is possible within the design of the Scheme. As the priority habitat along this corridor any impacts on woodlands will need to be minimised. This would take the form of avoiding direct intervention into woodland areas, and minimising any edge disturbance. Wherever possible mature trees should be retained, particularly around Trynlaw. Where removal or arboricultural works are to be undertaken, the trees will be subject to assessment with regard particularly to their bat roost potential and nesting bird potential. Impacts arising from tree and scrub removal should be mitigated by compensatory planting where possible;
- New road edges should include consideration of re-creating links or planting additional hedgerows. Landscape planting will be undertaken along the length of the Scheme, and further details of this are detailed in the Chapter 7 – Landscape and Visual Effects. The trees, scrub and any grassland mixes specified will be native species and have local provenance, in accordance with best practice;
- Working areas will be clearly defined, that prevent access to river channels and riverbank vegetation;
- On site storage of chemical, fuel or construction materials shall be limited to those needed for immediate construction. All surplus materials will be removed from the works site as soon as their immediate purpose has been concluded;
- The storage and construction compounds must be located within areas agreed with the Scheme ecologist, and clearly marked and fenced if necessary, to avoid incursion into ecologically sensitive habitats;
- Contractors will implement SEPA Pollution Prevention Guidelines (PPGs), including PPG2, PPG5, and PPG6 during the construction period, to safeguard the aquatic ecology interest of the watercourses within the site. CIRIA Report SP156. Control of Water Pollution from Construction Sites – Guide to Good Practice will also be referred to. Contractors will also have to comply with the regulatory controls of the Water Environment (Controlled Activities) (Scotland) Regulations 2005;
- Sustainable Urban Drainage System (SUDS) principles should be applied at suitable locations to trap operational related run-off to watercourses. It is anticipated that the requirement for SUDS systems, and exact locations will be decided in agreement with SEPA in accordance with the technical guidance set

out in CIRIA Report C521 "Sustainable Urban Drainage Systems (SUDS) – a design manual for Scotland and Northern Ireland". This is likely to include provision of SUDS ponds at Bogend Toll Junction and Symington Junction. Other sections, which flow directly to watercourses, may be drained through carrier drains, which will provide some attenuation of the flows in advance of the outfalls, and some settlement of grit and other deposits will be achieved within the gullies. Before each outfall there may be a requirement for bypass type fuel/oil interceptors providing primary treatment for the flows in advance of discharge to a watercourse (see Chapter 12).

- The discharge of polluted waters will be avoided. Pollution contingency plans will be developed, including employment of silt traps. These should include designated members of staff to deal with emergencies if they arise;

These mitigation measures will substantially mitigate against impacts upon habitats.

Breeding Birds

Legislative Framework

All wild bird species are protected from killing, injury and taking under the Schedule 6 of the WCA. In addition, this legislation makes it an offence to take, damage or destroy a nest while in use or being built, and to take or destroy the eggs of any nesting bird. In addition, certain species are listed on Schedule 1 of the WCA. This makes it an additional offence to intentionally or recklessly disturb the adults while they are in and around their nest or intentionally or recklessly disturb their dependent young. Several bird species protected by the WCA (as amended) are also covered by Annex I of the EC Birds Directive (1979), affording them European protection.

Mitigation

To avoid impacts, all tree or scrub removal should be undertaken outwith the breeding bird season, which is regarded as being between mid-March and August.

Vegetation and tree removal should be avoided and minimised where possible. Landscape planting will be undertaken around the proposed Scheme to compensate for the loss of potential breeding habitat and further details of this will be provided in the landscape chapter. These plants should be native and of local provenance. **This will partially mitigate against the potential impacts on breeding birds.**

Otter

Legislative Framework

The otter is listed on Schedules 5 and 6 of the WCA. Under the provisions of this Act it is a criminal offence in most circumstances to intentionally kill, take or injure an otter; intentionally disturb an otter in its place of shelter; intentionally damage, destroy or obstruct access to a place of shelter. The EC Habitats Directive implemented through the CNH Regulations makes provisions to protect both a species and its habitat. Under these regulations, it is also an offence to damage or

destroy an otter shelter, whether intentionally or not; or to deliberately disturb an otter. Therefore, it is clear that holts and couches are both covered by the legislation whether or not an otter is present (SNH, 1997).

There are provisions in the legislation to allow actions to take place under licence that will otherwise contravene the above law, and the licence will be issued by SEERAD. There are no implications for this Scheme at the current time.

Mitigation

The Scheme ecologist should conduct pre-construction checks for otter activity along the Pow and Dow's Burn, so see if they are utilising habitat on the site in close proximity to any of the construction activities or proposed construction compounds. These checks should continue throughout the construction period. Should otter shelters be found, there are provisions in the legislation to allow actions to take place under licence that would otherwise contravene the above law. The implications for the proposed Scheme are that any couches or holts found within the site, must not be disturbed either during Scheme works or during the operation of the proposed road Scheme.

As general precautionary measures a number of measures should be implemented. Site compounds where lighting is used should be located well away from any of the watercourses, the Pow Burn in particular, so that the lighting does not disturb otter activity during the hours of darkness. Site staff should be made aware of the potential presence of otters crossing roads within the Scheme area and on nearby roads, which can be included in the site induction "Toolbox talk".

There are several records of otter road deaths (shown on Figure 6.1), which indicate that otters have crossed the road at various locations, particularly at Broad Tongue Wood and Whitelees. However, it is not deemed appropriate to provide otter underpasses as part of the Scheme, as there are no major water crossings proposed, and given the layout of watercourses along the study corridor, otters could potentially cross the road at any location along the A77 travelling from the Pow Burn to parallel watercourses north of the A77. However, otter signage would be appropriate measure, to alert vehicle travellers to the likely presence of otters along this stretch, at key locations.

These measures should substantially mitigate against negative impacts.

Water Voles

Legislative Framework

Since 1998, the water vole has received limited legal protection through its inclusion on Schedule 5 of the WCA, in respect of Section 9(4) only (Strachan, 1998). This section of the Act protects the water vole's places of shelter or protection, but does not protect the voles themselves. At the current time there are proposals for further protection to be afforded to the water vole. Legal protection makes it an offence to intentionally or recklessly damage or destroy or obstruct access to any structure or place that water voles use for shelter or protection or disturb water voles while they are using such a place. There is no provision for licensing the intentional destruction of water vole burrows for development or maintenance operations. The water vole is listed as priority species in the UKBAP.

Mitigation

The Scheme ecologist should conduct pre-construction checks for water vole activity along the Pow and Dow's Burn, so see if they are utilising habitat on the site in close proximity to any of the construction activities, particularly along Dow's Burn.

These measures should substantially mitigate against negative impacts.

Bats

Legislative Framework

All British bat species are listed on Schedule 5 (Section 9) and Schedule 6 of the WCA. They are also covered by Regulation 38 (Schedule 2) of the CNH Regulations. Under the Bern Convention, Pipistrelle bats are listed on Schedule III as 'protected' species, while the other species of bats are on Schedule II ('strictly protected'). It is an offence to intentionally or deliberately kill, injure or capture (take) a bat; deliberately disturb a bat (whether in a roost or not); and damage, destroy or obstruct access to a bat roost. For the purposes of bat protection, a bat roost is defined as "any structure or place, which is used for shelter or protection", regardless of whether it is in use or not. It is a legal requirement to consult SNH before any work is carried out that might affect bats or their roosts. This might include building, alteration or maintenance work; exclusion of bat colonies; reproofing; and remedial timber treatment; and removing hollow trees. Provisions are made within the legislation to allow works to take place under licence from SEERAD that will otherwise contravene the Acts.

Mitigation

As many deciduous trees as possible should be retained to provide potential bat roost habitat. Continuous strips of woodland should be maintained, in order to provide corridors for bats to access their foraging sites. If mature trees are to be felled, they should be checked immediately prior to felling by a bat specialist, and the felling should be done in a step-wise manner, with the bat specialists checking for bats as each limb is removed. This will of particular importance at Trynlaw where mature and ivy-clad trees are present.

These measures should form substantial mitigation for bats.

6.8.4 Monitoring

It would be prudent to further monitor badger and otter deaths along the A77 to monitor their number and movements throughout the route corridor.

6.9 Residual Impacts

Residual impacts are placed in context within the summary Table 6.8 below, which shows source of impacts (construction and operation), impact significance prior to mitigation, mitigation extent, and residual impacts after mitigation. A summary of mitigation measures is provided within Chapter 15.

All residual impacts are deemed to be not significant at the regional/local levels, based on the presumption that all mitigation measures are fully implemented.

6.10 Summary

Areas of long-established woodland of plantation origin (as designated by Scottish Natural Heritage) are found in close proximity to the proposed re-alignment of the road, but will not be directly affected.

Pollution control measures and Sustainable Urban Drainage Systems will have to be implemented to safeguard the water quality of the Pow Burn and Dow's Burn, notably from pollution incidents during both the construction and operational phase of the Scheme. With mitigation measures applied, the significance of the impact should not be significant.

There are limited areas of direct habitat loss, which will only affect semi-natural habitats of low ecological value, and impacts are deemed to be not significant. Compensatory planting of native species of local provenance should substantially mitigate against this loss.

Significant impacts are not anticipated for otters, water voles or breeding birds, or any other features of ecological interest, subject to the implementation of specific mitigation measures such as pre-construction checks and methods to avoid disturbance during construction and operation.

Impacts upon badgers are discussed separately within the Confidential Badger Annex (Appendix 8)

Table 6.8 – Summary of Impacts Before Mitigation, Mitigation and Residual Impacts

Proposed activity, duration of activity, biophysical change and relevance to receptor in terms of ecosystem structure and function	Characterisation of unmitigated impact on feature	Rational for prediction of effect on integrity or conservation status	Significance without mitigation and confidence in assessment	Mitigation Extent	Residual significance and confidence level
CONSTRUCTION					
Site Clearance: Physical removal of soils and vegetation, break-up of hard-standing and the consequent loss or substantial modification of the whole or part of a habitat. This may result in the removal or fragmentation of habitats and breeding and foraging areas of faunal species.	**Habitats:** Felling of trees, scrub, hedgerows, loss of grassland and potential impacts upon open water.	These habitats are highly modified and managed and viewed as of site/local importance and there is an abundance of these habitats in the wider area. Impacts will be minimal.	Direct impacts on these habitats are considered not significant negative at the site/local level and certain to happen.	Substantial	Not significant negative at the site/local level: certain.
	Breeding Birds: Outside the breeding season: direct impacts would relate to removal of foraging habitat in general and disturbance to birds in the vicinity.	Removal of habitat alters the availability of forage and roosting and may decrease the attractiveness of an area to birds, potentially creating changes in the population dynamics of an area. A significant territorial and forage resource is still available in adjacent areas and areas not directly impacted by the road improvements.	Given the availability of comparable habitat in the wider area and minimal land-take required, impacts are anticipated to be not significant negative at the regional/local level and unlikely to occur.	Substantial	Not significant negative at the regional/local: unlikely.

Proposed activity, duration of activity, biophysical change and relevance to receptor in terms of ecosystem structure and function	Characterisation of unmitigated impact on feature	Rational for prediction of effect on integrity or conservation status	Significance without mitigation and confidence in assessment	Mitigation Extent	Residual significance and confidence level
	Otters: The direct impacts on the otters themselves or their rest areas due to construction activity.	It is not anticipated that there will be any direct impacts on otters provided that the Pow Burn remains unaffected.	Not significant negative at the regional level and extremely unlikely to happen.	Substantial	Not significant negative at the regional level: extremely unlikely.
	Water Voles: The direct impacts on the water voles, their burrows, or their suitable habitat due to site clearance construction activity.	No signs of water vole activity or burrows were observed within the watercourses in the study area, but there is suitable habitat available.	Not significant at the regional level and extremely unlikely to occur.	Substantial	Not significant negative at the regional level: extremely unlikely.
	Bats: a) The permanent and irreversible loss/disturbance of roosting bats through tree felling.	a) At the time of survey time no roosts were found, but old trees with suitable cracks/ivy matrices were located at Trynlaw, which may be felled.	a) Should bat roosts be present in these trees at the time of construction the impacts will be significant negative at the regional level, and likely to happen.	a) Substantial	a) Not significant negative at the regional level: unlikely.

Proposed activity, duration of activity, biophysical change and relevance to receptor in terms of ecosystem structure and function	Characterisation of unmitigated impact on feature	Rational for prediction of effect on integrity or conservation status	Significance without mitigation and confidence in assessment	Mitigation Extent	Residual significance and confidence level
	b) Permanent and irreversible loss of bat forage habitat	b) Loss of bat forage relates mainly to woodland edge and hedgerows, but the extent that is likely to be lost is considered not significant such that it would negatively impact the local bat populations. The greatest amount of bat activity was found at Coodham Estate, which will not be impacted. The new roads are likely to only require minimal amount of removal of suitable bats habitat.	b) The severance of hedgerows and removal of scrub/vegetation along the rest of the site is considered to be not-significant negative at the regional level and likely to happen.	b) Substantial	b) Not significant negative at the regional level: unlikely.
Construction operations and human and vehicular presence, causing noise, lighting and vibration disturbance to species, and potential effects of dust on vegetation remaining on-site, and adjacent to the site.	**Non-statutory designated sites**: Dust deposition may arise from site enablement and construction phases. The effects are primarily that vegetation, coated with dust, suffers drought stress. The effects of wind can carry the dust over a greater area.	At this site it is considered unlikely that levels of dust or its transportation will significantly affect adjacent vegetation.	These indirect impacts are anticipated to be not significant and negative at the regional level and unlikely to happen.	Substantial	Not significant and negative at the regional level: unlikely.

Proposed activity, duration of activity, biophysical change and relevance to receptor in terms of ecosystem structure and function	Characterisation of unmitigated impact on feature	Rational for prediction of effect on integrity or conservation status	Significance without mitigation and confidence in assessment	Mitigation Extent	Residual significance and confidence level
	Habitats: As above for non-statutory designated sites	At this site it is considered unlikely that levels of dust or its transportation will significantly affect adjacent vegetation.	These indirect impacts are anticipated to be not significant and negative at the site level and unlikely to happen.	Substantial	Not significant and negative at the regional level: unlikely.
	Breeding Birds: Should works be carried out outwith the breeding bird season, birds may choose to forage/roost further from the construction activity area.	Once construction is complete it must be assumed that birds currently present along the A77 corridor will re-acclimatise.	This would be considered a not significant negative impact at the regional/local level and likely to happen.	Substantial.	Not significant negative impact at the regional/local level: likely.

Proposed activity, duration of activity, biophysical change and relevance to receptor in terms of ecosystem structure and function	Characterisation of unmitigated impact on feature	Rational for prediction of effect on integrity or conservation status	Significance without mitigation and confidence in assessment	Mitigation Extent	Residual significance and confidence level
	Otters: There is the potential for disturbance to otters due to construction activity. There will be a considerable increase in vehicle movements as construction-related vehicles, which could increase the potential for road kill incidents. Disturbance could arise as a result of human activity, vehicle movements, noise and lighting from the compounds.	The likelihood of road casualties is assessed as 'extremely unlikely'. Although the survey results indicate that otters do currently move along the Pow Burn infrequently, therefore, the location of any temporary construction compounds in close proximity to the watercourse could lead to a disturbance effect upon any otters moving in the area.	The disturbance impacts upon otters are therefore considered to be not-significant negative at the regional level and extremely unlikely to happen.	Substantial.	Not-significant negative at the regional level: extremely unlikely.
	Water Voles: Disturbance to water voles due to construction activity.	No signs of water vole activity or burrows were observed within the watercourses in the study area, but there is suitable habitat available.	Not significant at the regional level and extremely unlikely to occur.	Substantial.	Not-significant negative at the regional level: extremely unlikely.

Proposed activity, duration of activity, biophysical change and relevance to receptor in terms of ecosystem structure and function	Characterisation of unmitigated impact on feature	Rational for prediction of effect on integrity or conservation status	Significance without mitigation and confidence in assessment	Mitigation Extent	Residual significance and confidence level
	Bats: Bats may be disturbed by the noise, lighting, vibration and presence of people and machinery during the construction phase.	However, as with birds, the bats in this area are presently acclimatised to the noise of the A77 and the activity of local residents.	It is considered that the negative impact on bats of works to the existing road line or future traffic on any new road line is not significant, negative at the regional level, and extremely unlikely to happen.	Substantial.	Not-significant negative at the regional level: extremely unlikely.
Discharge of sediments and possible pollutants to surrounding watercourses during construction	**Non-statutory designated sites**: Pow Burn is designated on South Ayrshire Councils Wildlife Strategy and there is potential for temporary reversible impacts	No direct disruption to the Pow Burn is anticipated. In the unlikely event of contamination through pollution incidents, there could be negative impacts on the river vegetation, fish, invertebrates, and consequently the other faunal species such as otter that depend on the river. The Pow Burn/Dow's Burn are highly modified and impacts anticipated as minimal and short term.	Direct impacts on the Pow Burn are considered not significant negative at the regional level and unlikely to happen.	Substantial.	Not-significant negative at the regional level: unlikely.

Proposed activity, duration of activity, biophysical change and relevance to receptor in terms of ecosystem structure and function	Characterisation of unmitigated impact on feature	Rational for prediction of effect on integrity or conservation status	Significance without mitigation and confidence in assessment	Mitigation Extent	Residual significance and confidence level
	Habitats: Potential pollution of watercourses, mainly Pow Burn and Dow's Burn and potential for temporary reversible impacts	Direct impacts may occur through contamination of watercourses, which could have negative impacts on the river vegetation, fish, invertebrates, and consequently the other faunal species such as otter that depend on the river. Effects could also be carried several kilometres downstream. These habitats are highly modified and impacts anticipated as minimal and short term.	Direct impacts on these habitats are considered not significant negative at the local level and unlikely to happen.	Substantial.	Not-significant negative at the local/site level: unlikely.
OPERATION					
The potential negative ecological impacts involved with the operation of the new road scheme may potentially involve noise, water quality impacts, air quality	**Non-statutory designated sites**: On-going effects such as pollution, dust deposition, etc.	No operational impacts anticipated.	The impact upon the non-statutory designated sites during the operational phase of the Scheme is assessed as not significant at the regional level and unlikely to occur.	Substantial.	Not significant at the regional level; extremely unlikely.

Proposed activity, duration of activity, biophysical change and relevance to receptor in terms of ecosystem structure and function	Characterisation of unmitigated impact on feature	Rational for prediction of effect on integrity or conservation status	Significance without mitigation and confidence in assessment	Mitigation Extent	Residual significance and confidence level
impacts, new lighting and road signage, increased risk of road mortality to badger, otter and birds.	**Habitats**: On-going effects such as pollution, dust deposition, etc.	a) No operational impacts anticipated on terrestrial habitats.	a) The impact upon the terrestrial habitats during the operational phase of the Scheme is assessed as not significant at the local level and unlikely to occur.	a) Substantial.	a) Not significant at the site/local level; extremely unlikely.
		b) There may be potential negative impacts during operational phase related to potentially pollutant-laden run-off entering drains, and then flowing into watercourses such as Dow's and Pow Burn.	b) The impact upon the water habitats during the operational phase of the Scheme is assessed as not significant at the local level and unlikely to occur.	b) Substantial.	b) Not significant at the local level: unlikely to occur
	Breeding Birds: Disturbance to foraging/nesting birds	Birds in this area are presently acclimatised to the noise of the A77 and the activity of local residents, and it is not considered that there will be a substantial increase in impacts during the operation of the Scheme.	It is considered that the negative impact on birds of works to the existing road line or future traffic on any new road line is not significant, negative at the regional/local level, and extremely unlikely to happen.	Substantial.	Not significant, negative at the regional/local level: extremely unlikely.

Proposed activity, duration of activity, biophysical change and relevance to receptor in terms of ecosystem structure and function	Characterisation of unmitigated impact on feature	Rational for prediction of effect on integrity or conservation status	Significance without mitigation and confidence in assessment	Mitigation Extent	Residual significance and confidence level
	Otters: Increased risk of road mortality	There is a slightly increased risk of road mortality due to otters crossing the new junctions/access roads, however these are access roads and traffic should be travelling relatively slowly, so avoidance of impact may be possible in the majority of instances.	Therefore, impacts are anticipated to be not significant at the regional level and extremely unlikely to occur.	Substantial.	Not significant at the regional level; extremely unlikely.
	Water voles: Disturbance impacts	No signs of water vole activity or burrows were observed within the watercourses in the study area. Further, no suitable habitat for water voles will be affected by operational phase the proposed Scheme.	Therefore, impacts are anticipated to be not significant at the regional level and extremely unlikely to occur	Substantial.	Not significant at the regional level; extremely unlikely.
	Bats: Disturbance to foraging and roosting bats	Bats in this area are presently acclimatised to the A77 and the activity of local residents, and it is not considered that there will be a substantial increase in impacts during the operation of the Scheme.	It is considered that the negative impact on bats of works to the existing road line or future traffic on any new road line is not significant, negative at the regional level, and extremely unlikely to happen.	Substantial.	Not significant at the regional level; extremely unlikely.