

8 Ecology and Nature Conservation

8.1 Introduction

This section presents the results of background research and ecological surveys undertaken to establish the baseline conditions and the nature conservation value of the area of land in the vicinity of the preferred road improvement scheme for the A68 between Pathhead and Tynehead (Figure 8.1). This section then provides an Ecological Impact Assessment (EclA) of the potential impacts arising from the proposed scheme (Figure 2.1) on the ecological interest within and adjacent to the proposed route alignment (to a distance of 500m from route). Potential impacts have been determined through consultations (at DMRB Stages 1, 2 and 3), review of previous scheme reports (Young Associates, 2004; Young Associates, 2006) and ecological field surveys. Where significant ecological impacts are identified, mitigation measures are proposed in order to minimise the level of any adverse impacts. The biodiversity value of any new habitats created is maximised; and other measures of best practice are also identified where relevant, or where there is a legal requirement. Any cumulative impacts are assessed and the chapter concludes with a summary of the residual impact.

8.2 Methods

The methodology followed for this EclA is as described for a Stage 3 assessment in the DMRB Volume 11, Section 3, Part 4 Ecology and Nature Conservation, Chapter 7. The impact assessment methodology has been developed by YA/AEE from a review of the most up to date guidance documents.

8.2.1 Consultations and Desk Study

Consultation and review of existing information through desk-based study are an important first stage of the ecological assessment process. These methods are used to identify areas within, or close to, the scheme corridor that are designated for their nature conservation interest, and to gather information about whether the area is likely to support habitats and / or species of nature conservation significance. Gathering preliminary data for a site in this way means that field survey can be targeted in a more effective way than if surveyors were to commence surveys without first having taken account of background information.

As DMRB Stage 1 and 2 assessments (summarised in Chapter 2) have already been undertaken for the road improvement proposals for the A68 between Pathhead and Tynehead, relatively recent site-specific information has been gathered through desk study with respect to ecology. The desk study included review of the following reports:

- A68 Pathhead to Tynehead Improvement Scheme. Stage 1 Environmental Update Report. Final Report. June 2004 (YA, 2004).
- A68 Pathhead to Tynehead Junction Improvement Scheme. Stage 2

Environmental Assessment Report, September 2006 (YA, 2006).

Further ecological consultations on the preferred scheme were completed in June 2006 to obtain an update of the various consultees' opinions on the scope of work for the current Stage 3 assessment, and their preliminary views on potential impacts and mitigation. The organisations listed below were consulted by letter, and follow-up emails / telephone calls were undertaken where necessary:

- Lothian Bat Group;
- Midlothian Council Planning Unit;
- Scottish Badgers;
- Scottish Environmental Protection Agency;
- Scottish Executive; and
- Scottish Natural Heritage.

Other (non-statutory) consultees were consulted with respect to ecology throughout the DMRB assessment process (Stages 1 and 2), and are listed within Chapter 4 (Consultations) and Table 4.1, along with a summary of their responses in Appendix 1. These consultees were not contacted again at Stage 3 as no additional comments were received at Stage 2.

8.2.2 Field Survey

Extended Phase 1 Habitat Survey

The study area was subject to an extended Phase 1 habitat survey, first completed in April 2004, repeated in July 2005 with additional species surveys in October 2005 (for Stage 2), and updated in April 2007 (for Stage 3); focusing primarily on agricultural, semi-natural and other vegetated land up to approximately 500 m either side and at each end of the scheme extents (Figure 8.2). Phase 1 habitat survey is a standardised method of recording habitat types and characteristic vegetation, as set out in the "Handbook for Phase 1 Habitat Survey – a technique for Environmental Audit" (JNCC, 2003). This habitat survey method was extended in accordance with the "Guidelines for Baseline Ecological Assessment" (IEA, 1995) through the additional recording of specific features indicating the presence, or likely presence, of protected species or other species of nature conservation significance. Descriptive "target notes" were recorded to provide details of characteristic habitats, features of ecological interest, or any other features which required note to aid ecologically sensitive design or mitigation. Species lists, including all plants, which were present at the time of survey (there is always a risk of late summer / autumn or early spring plants not being visible), as well as incidental records of other faunal species, are also provided. Higher plant species nomenclature follows Stace, 1997.

While not a full botanical or protected species survey, the extended Phase 1 method of survey enables suitably trained and experienced ecologists to obtain an understanding of the ecology of a site such that it is possible either:

1. to confirm the conservation significance of the site and assess the potential for impacts on habitats / species likely to represent a material consideration in planning terms; or
2. to establish the scope and extent of any additional specialist ecological surveys that will be required before such confirmation can be made.

Protected Species Survey

Initial searches for evidence of badger, otter, water vole, red squirrel and bat were carried out during April 2004 (extended Phase 1 habitat survey comprising incidental records of faunal species) as part of the DMRB Stage 2 Environmental Assessment and subsequently during the further extended Phase 1 habitat surveys detailed above. Additional detailed species specific surveys were completed for badger and otter in October 2005.

Detailed species-specific habitat and activity surveys were completed for the DMRB Stage 3 Environmental Assessment for badger, otter, water vole and bat during the dates detailed in Table 8.1 below. These species-specific surveys followed the recommendations within the Stage 2 Environmental Report. Surveying was completed by experienced and fully qualified ecologists and followed recognised standard methodology (at those times) including:

- Completion of an evaluation of the habitats present, how they are managed and their potential to provide a suitable environment for the particular protected species;
- Searching for physical evidence of a particular faunal species such as tracks, footprints, hairs, droppings, spraints, latrines, roosts, holts, burrows, setts; vocal noises; feeding stations, foraging evidence and food remains;
- Recording all signs of protected species of fauna; and
- Assessing the level of use of the site by a protected species based on any evidence discovered.

Species-specific survey methods are described in section 8.3.5.

Table 8.1. Stage 3 Species-specific Surveys.

Species	Status (Highest Level)	Survey Date
Otter	European Protected Species	February and April 2007
Bat	European Protected Species	March and May 2007
Water vole	UK Protected Species (places of shelter)	April 2007
Badger	UK Protected Species	April 2006 and March 2007

In addition, any signs of Wildlife and Countryside Act (1981) Schedule 1 bird species were noted, as far as possible; although specific bird surveys were not carried out (during consultation SNH / RSPB had not requested any specific bird surveys were carried out).

8.2.3 Impact Assessment Methods

In addition to the guidance / requirements of DMRB Volumes 10 and 11, this EclA has been developed in accordance with appropriate legislation and guidance and current best practice including the following publications:

- National Planning Policy Guideline (NPPG) 14, Natural Heritage. Scottish Office Development Department, 1999;
- PAN 58: Environmental Impact Assessment (Scottish Office, 1999);
- PAN 60; Planning and Natural Heritage. Scottish Executive Development Department, 2000;
- Circular 15/99 Environmental Impact Assessment (Scotland) Regulations, 1999 (now superseded by Planning Circular 8 2007 issued by Scottish Government);
- Institute of Ecology and Environmental Management. Guidelines for Ecological Impact Assessment Final Consultation (IEEM, July 2006);
- Transport Analysis Guidance (TAG) Unit 3.3.10. The Biodiversity Sub-Objective. Department for Transport. December 2004;
- Scottish Natural Heritage's Handbook on Environmental Impact Assessment, 2005;
- EU Habitats Directive 92/43/EEC;
- EU Birds Directive 79/409/EEC; and
- Nature Conservation: Implementation in Scotland of EC Directives on the Conservation of Natural Habitats and of Wild Flora and Fauna and the Conservation of Wild Birds ('The Habitats and Birds Directives') (Scottish Executive, 2000).

A description of each potential impact is provided, along with an assessment of significance of the impact (temporary or permanent and beneficial or adverse) on the ecological interest in the area arising during the construction and operation stages of the development pre and post mitigation. For clarification, impacts that arise during construction that do not continue into the operational stage, are assessed within Chapter 15 (Disruption due to Construction). Impacts arising during construction and continuing into operation, e.g. loss of land, are included within this Chapter. As outlined in Chapter 3 (Approach and Methods), impacts have been considered in terms of both the site value / sensitivity (nature conservation value) and the magnitude of impact. However the terminology used in this EclA may differ from that outlined in Chapter 3 (Approach and Methods), as explained below.

Determination of Habitat / Species / Site Value

The approach adopted for the EclA in this case (trunk road assessment) is set out below.

Criteria are applied to assess the nature conservation value of the habitats and species / populations that the site supports. As there is rarely any comprehensive quantitative data available on the habitat or species population resource, particularly at the regional to local level, the nature conservation evaluation process necessitates a qualitative component. This requires a suitably trained and experienced ecologist to make a professional judgment based upon a combination of published sources, consultation responses and knowledge of both the site and the wider area.

Table 8.2 details the categories of nature conservation value used in this chapter.

Table 8.2. Nature Conservation Value Categories.

Nature Conservation Value	Description of Sites, Habitats and Species
International	Sites, habitats and species populations of importance in a European context.
National	Sites, habitats and species populations of importance in the context of Scotland.
Regional	Sites, habitats and species populations of importance in the context of Central Scotland.
Local	Sites, habitats and species populations of importance in the context of the Midlothian district.
Low	Habitats and species populations of less than local importance, but of some value.
Negligible	Less than low conservation value, with no or negligible interest.

Magnitude of Impacts

The magnitude of an impact depends upon the nature and sensitivity of a receptor, and the range of potential effects arising from the implementation and operation of a proposed development. In assessing the likely magnitude of an effect, it is necessary to have as great an understanding as possible of its timing, intensity, frequency, duration and reversibility. For the purposes of this assessment, the nature of the effects on specific receptors is described in the predicted impacts section (Section 8.4), and then the magnitude of these combined effects is summarised as being in one of the following categories: “imperceptible”, “low”, “medium” or “high”, depending upon the extent of the area or population deemed likely to be affected by the development.

Table 8.3 provides an indication of the terms in which the magnitude of ecological impacts is considered in this Chapter. The following definitions (within Table 8.3) have been applied in respect of timescales: “immediate” – within approximately 12 months; “short-term” – within approximately 1 to 5 years; “medium-term” – within approximately 5 to 15 years; and “long-term” – 15 years or more.

Table 8.3. Ecological Levels of Impact Magnitude.

Magnitude	Description of Ecological Levels of Impact
High	Significant effects on the nature conservation status of the site, habitat or species, likely to threaten the long-term integrity of the system. Detectable in the short-, medium- and long-term.
Medium	Significant effects on the nature conservation status of the site, habitat or species, but would not threaten the long-term integrity of the system. Detectable in the short- and medium-term.
Low	Noticeable effect, but either sufficiently small or of short duration to cause no harm to the conservation status of the site, habitat or species. Detectable in the immediate and short-term but not in medium-term.
Imperceptible	Not expected to affect the conservation status of the site, habitat or species under consideration in any material way, therefore no noticeable effects on the ecological resource, even in the short-term.

Significance of Impacts

The determination of impact significance involves the interaction of both the nature conservation value of the site, habitat or species concerned; together with the magnitude of the various impacts upon it. The more ecologically valuable a site and the greater the magnitude of the impact, the higher the significance of that impact is likely to be.

Table 8.4 shows in general terms the way in which the significance of ecological impacts is considered in this Chapter. It is important to appreciate that this does not represent a rigid framework for assessment – there are gradations between different categories of site and impact, and on occasion, the significance of a particular impact may not accord precisely with the categories shown below. If such a departure is made in the text, the reasoning behind it will be explained. Impacts identified as minor and negligible are considered not to be significant for the purposes of this EclA, whereas impacts identified as moderate or above (i.e. major and exceptional) are considered significant. Impacts can be further described as “beneficial” or “adverse”, to demonstrate whether an impact can have a positive or negative effect.

Table 8.4. Generalised Impact Significance Matrix.

Nature Conservation Value	Magnitude of Potential Impact			
	High	Medium	Low	Imperceptible
International	Exceptional	Major	Moderate	Minor
National – Scotland	Exceptional	Major	Moderate	Minor
Regional – Central Scotland	Major	Moderate	Minor	Minor
Local – Midlothian District	Moderate	Minor	Minor	Negligible
Low – less than Local	Minor	Negligible	Negligible	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

8.3 Baseline Conditions

8.3.1 Consultations

In ecological terms, the main issues raised by the consultees relate to the modification of existing drains and culverts beneath the A68; potential pollution of the water environment (both surface water and groundwater); habitat preservation, particularly areas of long-established and semi-natural woodland; and potential impacts to otters and badgers.

8.3.2 Nature Conservation Designations

The location of designated nature conservation sites that are present within the vicinity of the preferred scheme are presented in Figure 8.1. There are three sites of nature conservation importance near to, or overlapping with the survey area: Hope Quarry SWT Wildlife Site (non-statutory); Fala Flow (Moor) Site of Special Scientific Interest (SSSI), Special Protection Area (SPA) and Ramsar Site; and Crichton Glen SSSI.

Hope Quarry Wildlife Site

One SWT Wildlife Site (non-statutory), Hope Quarry, is located partially within the survey area close to the A68 northbound carriageway near Hope, to the east of Crichton (Figure 8.1). This site is also recorded within the Midlothian Local Plan as a regionally and locally important nature conservation site. The quarry site, together with the mines which lead off from this, provide habitat for hibernating bats; notably Daubentons' bat, brown long-eared bat and Natterers' bat regularly use the feature, and also occasional whiskered bat have been recorded (pers. comm. Lothian Bat Group). This mine has been the subject of annual surveys, including ringing, for its bat species since 1987. The sites southern boundary is within approximately 250 m of the northern most extent of the proposed scheme options.

Fala Flow SSSI, SPA and Ramsar Site

Outwith the survey area there is the Fala Flow (Moor) SSSI, SPA and Ramsar site approximately 1.2 km to the south of the southern extent of the scheme, designated under Council Directive 79/409/EEC on the conservation of wild birds ('The Birds Directive') for its wintering population of around 6700 pink-footed goose (refer to Figure 8.1). Fala Flow is also a Ramsar wetland site of international importance, designated for its migratory pink-footed goose population, which is approximately 3 % of the population (Eastern Greenland / Iceland / UK) in accordance with the Ramsar Convention for Wetlands of International Importance (JNCC, 2004).

Crichton Glen SSSI

The Crichton Glen SSSI is approximately 2.7 km to the west of the scheme, near the village of Crichton, and is designated for its woodland, grassland and fen communities. There are also small SSSIs scattered throughout Costerton Mains and New Mains,

close to the Keith Water, with the closest of these approximately 1.5 km to the north-east of the survey area near to Fala Hall.

Designated Woodland

There is one area of designated Ancient Woodland (of semi-natural origin) within the survey area and in the vicinity of the preferred scheme option. This is on the east-facing bank within the Fala Dam valley to the south of, and adjacent to, the scheme extent. There are two areas of long-established plantation in the survey area. The nearest of these is Magazine Wood located to the south east of Hope adjacent to the A68 southbound carriageway and which borders a layby at this location (Figure 8.1). To the south there is another area of long-established plantation, Marl Law Wood, adjacent to the road to Whitburgh and the Salters Burn.

8.3.3 Habitats and Vegetation

A description of the Phase I habitat types recorded within the study area is provided below, with survey target notes recording particular features of interest and a species list provided within Appendix 8. Figure 8.2 illustrates the extent of Phase I habitat categories identified during the survey, along with specific target note locations.

General Character of the Site

The survey area comprises a mixture of habitat types and land uses. Woodland occurs across the area, in both coniferous and mixed stands, with diffuse deciduous woodland occurring around the area of Hope and the young plantation forming part of Marl Law Wood. Agricultural land dominates the surrounding area, with a mixture of arable and improved grazing land. There are no major watercourses within the survey area, however there are burns of reasonably high quality in terms of both aquatic and riparian habitat, namely the Salters Burn and Fala Dam Burn.

The following habitats, listed in the conventional order used in the Phase 1 manual rather than in order of abundance, have been recorded within the survey area:

- Broad-leaved plantation woodland;
- Mixed plantation woodland;
- Coniferous plantation woodland;
- Semi-natural broad-leaved woodland;
- Dense scrub;
- Scattered scrub;
- Standing water;
- Running water;
- Scattered trees;
- Improved grassland;
- Semi-improved grassland;
- Marshy grassland;
- Tall ruderal vegetation;

- Arable;
- Buildings;
- Fence;
- Wall;
- Species-rich hedge; and
- Species-poor hedge.

Within this Chapter, habitats are discussed in order of abundance within the study area, starting with those that are most common. Where appropriate, habitats have been grouped.

Habitats Associated With Lowland Agriculture

The survey area (see Figure 8.2), including land directly adjacent to the proposed A68 improvement scheme, is largely intensively managed lowland agricultural land (improved grassland). Areas of arable land are mainly located on the northern side of the A68 within the scheme extent, with a mixture of arable and improved pasture to the south. Although the grassland is of low diversity it may provide feeding and / or breeding for lapwing, since this species was noted north-east of the A68 towards the U77 Side Road (Section 8.3.6).

Modern post and wire fencing encloses the majority of the lowland farmland in the area. Drystone walling is present on both sides of the A68 adjacent to the Magazine Wood area and along the boundary between arable land and newly planted mixed plantation connecting Magazine Wood and Marl Law Wood (Figure 8.2). The walls are all well pointed and have little ecological value. Hedgerows of hawthorn *Crataegus monogyna* and / or beech *Fagus sylvatica* and with scattered mature trees are frequent throughout the area, though these were not species rich. The most notable is a mature hawthorn hedge between the Fala Dam and Costerton junctions of the A68 (refer to Figure 8.2).

All of these manmade habitats are common and widespread, both in the local area and more widely throughout Scotland and the rest of the UK and, although they support a range of flora and fauna, the intrinsic nature conservation value of the grassland and arable land, walls and hedges within the survey area is assessed as being of **low** nature conservation value.

Woodland and Scrub

Woodland around the area of Hope is predominantly sycamore *Acer pseudoplatanus*, and fairly open, though some regeneration is occurring. The ground here is steep in most places and the flora is of low diversity, including broad-buckler fern *Dryopteris dilatata*, wood avens *Geum urbanum* and common nettle *Urtica dioica* (Target Note 1, Figure 8.2). The most recent survey (April, 2007) noted that much of the central part of Hope Wood (west of the A68) has been lost due to the creation of a small landfill site. However, the northern, western and eastern margins of the wood remain relatively

unchanged. The access route to the landfill site has caused considerable habitat loss to the southern part of the woodland, including scrubland.

Opposite this woodland (Target Notes 2, 3 and 4) is deciduous woodland within a ravine, although the ravine is a product of mining which has now ceased. The canopy here is open and has a sparse shrub layer with abundant dead wood and moss. Ground flora is poor with dominant nettle and patches of black knapweed *Centaurea nigra*, primrose *Primula vulgaris* and wood sorrel *Oxalis acetosella*, for example. Within this valley there are also some newly planted areas with birch, sycamore and oak *Quercus robur*. An area of scrub is present around the residential property at Hope.

On the same south-west facing slope is another area of woodland forming a shelter belt (Target Note 5), which is quite dense and of plantation origin, mainly of Norway spruce *Picea abies* with occasional sycamore. The woodland is highly shaded and therefore the ground flora is modest, with creeping buttercup *Ranunculus repens*, common nettle and common woodland mosses.

There are areas of long-established plantation, notably Magazine Wood (Target Notes 6, 7 and 8) and Marl Law Wood (Target Note 9, Figure 8.2). Magazine Wood slopes gently toward the south-west and is predominately Sitka spruce *Picea sitchensis* plantation with occasional sycamore, larch *Larix decidua* and ash *Fraxinus excelsior*; and an under-storey dominated by common nettle with frequent elder *Sambucus nigra*, and some raspberry *Rubus idaeus* and wood avens. Shading is high within this woodland and this would explain the poorly developed ground flora. The most recent survey recorded that this woodland is in the process of being thinned.

At Target Note 8 there is a mixed species plantation. This woodland is approximately 20 – 30 years old and comprises species including hazel *Corylus avellana*, Scots pine *Pinus sylvestris*, Sitka spruce, sycamore and hawthorn. This younger wood merges into older woodland which is dominated by ash at the western half and then becomes Sitka spruce and elder.

Marl Law Wood is a deciduous plantation in an old limestone quarry with a bowl-shaped topography (the result of now ceased mining activity). The trees are between 10 and 20 years old. Sycamore and ash are abundant with other species including hawthorn, hazel and apple *Malus sylvestris* and the ground flora consisting of species such as common dog violet *Viola riviniana*, primrose and comfrey *Symphytum officinale*. There is some natural regeneration here, with an area of old ash coppice and another area of planted larch with sycamore and other vegetation throughout.

Along the Cakemuir Burn and Black Burn (Target Notes 13, 14, 15 and 16) there are shelter belt coniferous woodland areas mainly of Sitka spruce with deciduous edges of beech *Fagus sylvatica* and alder *Alnus glutinosa*. More open areas have bracken *Pteridium aquilinum* and elder dominating. To the north of the Fala Tunnel there are steep sided slopes. Within the steep Fala gorge there is mixed deciduous and

coniferous woodland, with abundant dead wood and a mix of tree species such as ash, silver birch *Betula pendula*, willow *Salix* spp., Sitka spruce and hazel and ground flora such as dogs mercury *Mercurialis perennis*, wood anemone *Anemone nemorosa*, wood sorrel and lesser celandine *Ranunculus ficaria*. The habitat here is rather damp in places and likely to provide insect prey for breeding birds. There is a large area of Sitka plantation with an elder dominated under-storey and wind-blow in the centre (Target Note 17 and 18). At Target Note 16 on the south bank of the A68 there is scrub of dominant raspberry with some meadowsweet *Filipendula ulmaria*, jointed rush *Juncus articulatus*, valerian *Valeriana officinalis* and lesser celandine. A small patch of alder *Alnus glutinosa* carr is adjacent to this area. To the north of the A68 there is another area of alder carr about the Cakemuir Burn, with abundant meadowsweet nearby and the ground being generally very damp here.

Although these habitats are generally unremarkable in a local and national context, the Designated Ancient Woodland (of semi-natural origin) in the Fala Dam Valley and the long-established plantation constituting Magazine Wood and Marl Law Wood, are assessed as having **regional** nature conservation value. The other areas of woodland within the ecological survey area, including the sycamore dominated open woodland around the area of Hope, the shelter belt coniferous woodlands along the Cakemuir Burn and Black Burn and further coniferous plantation within the Fala Gorge are assessed as **local** nature conservation value; as although lacking intrinsic value, most are closely associated with other, functionally complementary, semi-natural habitats, and may support protected, or other, species of conservation significance.

River Habitats

The main watercourses within the vicinity of the proposed scheme are Salters Burn (Target Note 10 and 11), Fala Dam Burn (Target Note 21), Black Burn (Target Note 12), Partridge Burn (Target Note 14) and Cakemuir Burn (Target Note 13 and 15). The Salters Burn starts on the west side of the A68 and crosses to the east side just north of the U77 Fala Dam junction. Approximately 3.5 km downstream of the crossing point it joins the East Water and becomes the Keith Water, a tributary of the Humbie Water, which itself flows into the Birns Water and then finally into the River Tyne.

Salters Burn is approximately 1-1.5 m wide within the survey area, with a stone, gravel and sand substrate, with fish passage possible. It is fenced off from livestock for much of its length, so the banks are herb rich with species including elder, alder, hawthorn, beech, ash, water forget-me-not *Myosotis scorpioides*, meadowsweet and marsh marigold *Caltha palustris*. The burn has been straightened in the vicinity of the A68 and passes through a concrete culvert. Away from the road the watercourse is more natural in character.

Fala Dam Burn is 3-4 m wide within the survey area, with a rock and gravel substrate and no channel vegetation. There are sand and gravel beaches along the burn and occasional deep pools. It is considered likely that fish are present within this burn, although no sightings were recorded. The banks are heavily vegetated with a lot of

overhanging deciduous trees, such as abundant willow sp. and frequent sycamore. There are abundant amounts of water forget-me-not, opposite-leaved golden saxifrage *Chrysosplenium oppositifolium* and dogs mercury, with frequent lesser celandine and occasional raspberry. This water course is natural in character along the entire length within the survey area, apart from where it passes under the A68 road bridge. At Fala Dam Burn there is a patch of Japanese knotweed *Fallopia japonica* (Target Note 20). The spread of Japanese knotweed by intention or through neglect is an offence under the Wildlife and Countryside Act, 1981 (Section 14, Part 2) as this plant is a highly invasive alien species in the UK that has no natural controls (such as herbivorous invertebrates, parasitic plants or fungi). If uncontrolled, the plant can cause serious direct damage to road surfaces and other structures.

The Black Burn (which runs into Cakemuir Burn) is surrounded by Sitka plantation with mature edges of beech and alder, and a common nettle dominated under-storey (Target Note 12). The burn is considered suitable for fish species and is around 1 m wide with a gravel and rocky substrate, of varying depth and has occasional pools.

Cakemuir Burn (Target Notes 13) lies within a valley of varying width and depth, though generally small, with steep slopes. Sitka spruce plantation with beech edges is found around this burn and the wood is dense with little or no under-storey. The slopes are generally wet with ground flora where open space exists, offering opportunity for meadowsweet, moschatel *Adoxa moschatellina*, lesser celandine, water avens *Geum rivale* and ground elder. Cakemuir Burn itself is around 3-4 m wide with pebble beaches and a rock and gravel substrate, riffles, meanders and pools. Salmonids (probably brown trout) were noted within the water and this burn is therefore considered to form suitable habitat for salmonids, due to the bed substrate of gravels.

There are two unnamed burns near the centre of the scheme, both of which run under the A68 from south-west to north-east (refer to Figure 8.2). These burns essentially comprise field drains discharging to the Salters Burn and are generally considered unsuitable for fish.

SEPA has advised that the Water Quality Classification of Keith Water is Class A1 (excellent quality) and that of Salters Burn, which runs into Keith Water, is likely to be of similar quality. The Cakemuir Burn is classed as A2 (good quality), whilst the Fala Dam Burn is assumed to be comparable to the Keith Water, i.e. A1.

Habitat evaluation of the survey area suggests that the watercourses provide suitable otter habitat for feeding and the creation of holts and suitable habitat for water vole on stretches of Salters Burn, however American mink (a predator of small mammals) was recorded on the Salters Burn at Target Note 21 on Figure 8.3, approximately 100 m from the water vole potential habitat (refer to Section 8.3.5).

Rivers and streams are listed on both the UK Biodiversity Action Plan (BAP) and Midlothian Local BAP as priority habitats. The Midlothian BAP contains a Habitat Action Plan (HAP) for rivers and burns, which principally aims to maintain and enhance

the ecology of river habitats.

Due to the emphasis placed on watercourses by both the UK and Midlothian BAP's, the riverine habitats within the ecological survey area supporting a range of important animal populations, including otter and, to a lesser extent, salmonids; and SEPA classifying water quality in these watercourses as either A1 (excellent) or A2 (good); these ecological features of the site are evaluated as being of **local** nature conservation value.

Habitats Associated with Built Structures

Within the survey area and adjacent to it, there are a number of features of potential value to bat species, such as disused lime kilns (Target Notes 5 and 7 on Figure 8.2), mines, quarries (in the Hope and Magazine Wood areas), bridges (including Salters Burn bridge on the Marldene access track (Target Note 21, Figure 8.3)), residential properties and stone ruins (refer to section 8.3.5 'Bats' below). Other man-made structures such as dry stone walls occur (as shown on Figure 8.2), although those located within the survey area are all well pointed and offer little ecological value for small mammals or reptiles, for instance. No nesting birds were recorded in any barn or shelter within the site, or adjacent to it.

The mines within the Hope area, which are known to provide habitat for hibernating bats, are assessed as being of **regional** nature conservation value. All other man-made structures are collectively assessed as being of **local** nature conservation interest due to their limited to moderate potential to support bat roosts (see section 8.3.5) and their relatively common and widespread occurrence in the area.

8.3.4 Locally Important / Nationally Important Flora Species

All wild plants are protected against uprooting, or removal from site, under Section 13 of the Wildlife and Countryside Act. Plants listed on Schedule 8 of the Act are provided special protection against picking, uprooting, destruction and sale. The Schedule is reviewed every five years, but currently it contains 107 vascular plants, 33 bryophytes, 26 lichens and 2 stoneworts. These include vascular plants, mosses, liverworts and hornworts, lichens and charophytes (stonewort).

No locally or nationally important (threatened, rare or scarce) flora species were recorded during Phase I habitat surveying.

Invasive Species

An extended Phase 1 habitat survey is not a comprehensive vegetation survey, although any observations of invasive plant species listed on Schedule 9 of the Wildlife and Countryside Act 1981, as amended, are noted.

Small patches of Japanese knotweed were recorded at NT43222 61677 and NT43078 61634 along the Fala Dam Burn, although this is out with the survey area. This alien

and invasive species is listed under the Wildlife and Countryside Act 1981 (as amended) (refer to Section 8.3.4).

8.3.5 Terrestrial Fauna

The preferred scheme lies within countryside containing habitat considered suitable for supporting populations of otter, bat species, badger *Meles meles*, water vole *Arvicola terrestris*, and red squirrel *Sciurus vulgaris*, amongst others. Baseline data and field survey have provided information on the current presence / absence of these species with full survey target notes provided in Appendix 8 and Figure 8.3. A summary is provided below.

Otter

The otter is a European Protected Species (EPS), protected by the EC Habitats Directive as implemented by the Conservation (Natural Habitats, &c) Regulations 1994 and The Conservation (Natural Habitats & c.) Amendment (Scotland) Regulations 2007. This makes it an offence to:

- Deliberately or recklessly capture, injure or kill a EPS;
- Deliberately or recklessly harass a EPS or group of EPS; disturb such an animal while it is occupying a structure or place which it uses for shelter or protection; disturb such an animal while it is rearing or otherwise caring for its young; to obstruct access to a breeding site or resting place of such an animal, or otherwise deny the animal use of the breeding site or resting place; disturb such an animal in a manner that is, or in circumstances which are, likely to significantly affect the local distribution or abundance of the species to which it belongs; or to disturb such an animal in a manner that is, or in circumstances which are, likely to impair its ability to survive, breed or reproduce, or rear or otherwise care for its young;
- Deliberately or recklessly take or destroy the eggs of a EPS; and
- Damage or destroy a breeding site or resting place of such an animal.

In addition, the otter is listed on Appendix I (most threatened species) of the Convention on the International Trade in Endangered Species (CITES) and Appendix II (strictly protected fauna) of the Bern Convention and in the UK Biodiversity Action Plan (BAP). The International Union for the Conservation of Nature (IUCN) list otter as Vulnerable, facing a high risk of extinction in the wild in the medium-term future.

The presence / absence of otters was surveyed for along the watercourses present in the survey area. Presence was identified from field signs of otter activity such as:

- Holts (cavities) & couches (flattened areas on grass) used as resting places;
- Spraints (droppings) left on rocks & bank sides as territorial markers;
- Footprints / tracks left in muddy river banks etc., indicating passage; and
- Slides down grassy / muddy banks in the water.

All field signs were recorded and mapped and standard key parameters, including weather conditions, water levels and habitat suitability were noted. Likewise, any significant absence of otter signs was also noted. Evidence of the presence of other species important to otter ecology such as American mink *Mustela vison*, which are believed to directly compete with otter for food sources such as fish, birds and small mammals, was recorded. Searches were completed along the watercourses within the survey area and along the banks covering a minimum corridor of 10 m on either side of each watercourse.

The desk study and protected species survey suggest that otters make regular use of the watercourses within the area. However, the closest record is on the Keith Water, 4 km to the north of the survey area at NT452 639.

As illustrated in Figure 8.3, otters have been identified as moving along the Salters Burn, the Cakemuir Burn and the Fala Dam Burn. Frequent evidence of otter activity was recorded during the surveys completed to date. During the 2004 survey a possible otter holt was recorded on the un-named burn that passes under the A68, near to the existing B6458 junction (Target note 8, Figure 8.3). During a later survey in October 2005, this holt could not be located, although dense brambles and rank vegetation obscured the view of lengths of bank. The survey undertaken in April 2007 for the Stage 3 Assessment noted that the hole (Target Note 33, Figure 8.3) is no longer obscured by vegetation, but shows no indication of use by otters or other mammals. Based on a detailed inspection and using professional judgement, it has therefore been determined that the hole is not in active use as a holt and is not considered to be a holt for the purposes of this assessment. However, the status of the hole will require further checking pre-construction to determine whether this situation has changed.

Otter spraints were recorded on the Salters Burn, the Cakemuir Burn and the Fala Dam Burn within the survey area (refer to Figure 8.3) and therefore it is concluded that otter are using all of these burns at some time, i.e. that any one burn is a part of an otters territory, in terms of food resources and potential for holt construction. Absence of otter evidence does not preclude the possibility of otter being present within the other burns, since otter have large territories and may commute several kilometers during the night, therefore they are likely to be moving along all of the watercourses within the survey area.

The Stage 3 survey recorded a particularly high level of sprainting on the Cakemuir Burn, upstream and downstream of A68. An active holt was also recorded on the burn about 170 m east of A68.

The Edinburgh and Lothians Badger Group have reported two otter fatalities on the A68 in the area of Fala Tunnel, which would confirm that otter are at times crossing the A68 at this point. No data on the precise location of the casualties is available, however.

Although the otter is a European Protected Species (EPS), and hence has an

international value in terms of its legislative protection; within the actual survey area, based on the results of field work (habitat evaluation and field signs) and consultations, otter has been given a value of **national**, in accordance with the criteria in Table 8.2.

Bats

All bat species are EPS and protected by the Conservation (Natural Habitats &c.) Regulations 1994 and The Conservation (Natural Habitats &c.) Amendment (Scotland) Regulations 2007. This means that it is an offence to:

- (a) deliberately or recklessly capture, injure or kill a bat;
- (b) deliberately or recklessly harass a bat or group of bats; disturb a bat while it is occupying a structure or place which it uses for shelter or protection; disturb a bat while it is rearing or otherwise caring for its young; obstruct access to a maternity or wintering roost or deny a bat the use of such breeding or resting places; disturb a bat in a manner that is, or circumstances which are, likely to significantly affect the local distribution or abundance of that particular species; disturb a bat in a manner that is, or in circumstances which are likely to impair its ability to survive, breed or reproduce, or rear or otherwise care for its young; or
- (c) damage or destroy a breeding site or resting place of a bat.

Common pipistrelle *Pipistrellus pipistrellus* is listed on Appendix III (protected fauna) of the Bern Convention, while other bat species within the Microchiroptera are listed on Appendix II (strictly protected fauna) of this Convention. Pipistrelles are the only bat species occurring in Scotland included within the UK BAP.

Daytime evaluation of the survey area with respect to features of potential use to bats or having the potential to support bat populations was undertaken as part of the extended Phase 1 survey during the Stage 2 assessment process in 2004/2005. This included any buildings or other structures (bridges / culverts / walls) and mature trees with bat potential. Additional surveys for bat roosts were also undertaken in March and May 2007.

As no buildings require demolition with respect to the preferred scheme, residential buildings were only examined externally while other structures were searched more thoroughly where safety allowed. Due to its close proximity to the scheme and the potential for disturbance, the stone bridge crossing the Salters Burn directly adjacent to the A68 (Target note 21 on Figure 8.3) was examined in detail, with the use of an endoscope, in September 2005. It was not considered necessary to examine other structures identified in such detail, due to their distance from the scheme, although further surveys may become necessary if structures are affected.

Trees with bat potential have cracks, crevices, loose bark flakes or dead limbs, while structures with bat potential have cracks and crevices, or access to cavities within. Signs of bats using a feature may include:

- Chattering noises heard near to dusk if bats are present;
- Droppings and urine stains adjacent to an exit / entrance point or on the flooring, material underneath;
- Grease marks on woodwork etc, from oils deposited as bats enter / emerge; and
- Scratch marks on wood surfaces, though these are much less common.

The presence of suitable bat foraging habitats such as woodland edges, hedgerows, wetland and watercourses were also noted. In all instances of no evidence of bat roost, the feature was accorded a value of potential to roosting bats; i.e. high potential structures display many features often used by roosting bats, medium potential structures display some features often used by roosting bats, or a particularly high quality feature and low potential structures display few or no features used by roosting bats. Low potential value structures were dismissed in terms of this EclA.

Although no evidence of bat roosts within the survey area have been recorded to date, old buildings, stone-built structures including lime kilns and bridges and mature trees provide suitable bat habitat throughout the survey area (refer to Figure 8.3). The desk study and consultation exercise, including references from the NBN Gateway website and personal communications with the Lothian Bat Group, have confirmed records for common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, Natterer's bat *Myotis nattereri*, and Daubenton's bat *Myotis daubentonii*, whiskered bat *Myotis mystacinus* and brown long-eared bat *Plecotus auritus* within the 10 km grid square within which the survey area falls.

Several lime kilns are located to the east of the A68, remnants of the now ceased lime making industry which used to operate in and around the limestone quarries within the survey area (Target Note notes 19 and 20 and Figure 8.3). These lime kilns have been assessed as possessing features of moderate to high potential to support roosting bats, and are situated within, or directly adjacent to good foraging habitat. The lime kiln within Magazine Wood, directly adjacent to the area of woodland due to be felled, was subjected to a dusk / dawn bat emergence survey as part of the Stage 3 assessment. No bats were recorded roosting within the lime kiln, although the structure is still assessed as having moderate to high potential to support roosting bats.

A number of stone bridges (Target Notes 12, 13, 14, 17, 18 and 21 of Figure 8.3) are also located around the survey area, in varying states of repair. Although some of these bridges did possess features of low to moderate potential to support roosting bats, many of these features were below the high water mark and so are unlikely to be used by roosting bats and upon inspection, no evidence of use by roosting bats was recorded. A bat survey (completed by a licensed bat worker using an endoscope) has indicated that the bridge under which the Salters Burn flows, shortly after it passes beneath the A68, is not suitable for roosting bats due to cavities present being located beneath the high water mark.

There are mature trees throughout the survey area, although over-mature trees with well developed features of use to roosting bats are less common. A number of mature trees of mixed species (Target Note 22) are located at Marldene which offer medium-high roosting opportunity. Similarly at Target Note 24 there are over-mature ash trees and lime and sycamore trees at Target Note 25, to the north of the scheme, also assessed to be of medium-high potential. At Target Note 28, old ash and sycamore trees near to Haugh Head House are considered to offer potential for bats, and at Target Note 11 there is an over-mature beech tree with cavities considered to offer some potential for bats also. A dusk / dawn bat activity survey in the vicinity of the area of mature coniferous plantation due to be felled at the western edge of Magazine Wood, confirmed both soprano and common pipistrelle foraging in low numbers. Due to the length of time after dusk when the bats were first recorded, it is unlikely they are roosting within the area of woodland to be felled. Also, due to the low numbers of bats recorded, it is unlikely that a maternity roost is present in the vicinity.

Due to the presence of the mines and quarries to the north of the scheme extent, at Hope and also further east, which are known to include winter hibernacula for bat species such as Daubentons' bat, Natterers' bat, brown long-eared and also whiskered bat (pers. com. Lothian Bat Group), there is considered to be a potential for the presence of bats throughout the survey area. The area in general has a relatively high degree of connectivity in terms of woodlands, edge habitat and shelter belts, and there are many small watercourses and damp woodlands which are considered likely to provide insect food for foraging bats. Due to these factors it would be expected that bats are present and using the woodlands and wooded burns for foraging, and that the trees and man-made structures in the area are likely to contain roosting bats.

Although roosting bats are protected in a European context (i.e. they are EPS), and hence have an international value in terms of its legislative protection, within the actual survey area, based on the results of field work (habitat evaluation) and consultations, and in accordance with the criteria in Table 8.2, bats have been given a value of **regional** in terms of potential for roosts within lime kilns and **low to local** in terms of trees.

Red Squirrel

Red squirrel is protected under Sections 9 and 11, through listing on Schedules 5 and 6, of the Wildlife and Countryside Act 1981 (as amended). This makes it illegal to intentionally kill, or injure a red squirrel; or to sell the animal or parts of it; intentionally disturb a red squirrel in its place of shelter and intentionally damage, destroy or obstruct access to a place of shelter. Red squirrel is also listed on Appendix III (protected fauna) of the Bern Convention and the UK BAP.

Searches of potential red squirrel habitat such as coniferous and mixed woodland were carried out during the extended Phase 1 habitat surveys in 2004 and 2005 and most recently in April 2007 and included a search for the following:

- Visual surveys recording sightings (where and when) and behavior;
- Counting of any nest sites (dreys); and
- Noting any evidence of feeding, droppings, scratched trees and hairs.

The presence of grey squirrels was also recorded, as a species whose presence directly impacts on the ecology of red squirrel through direct competition for food resources.

The results of the desk study and consultation exercise highlighted nearby recorded red squirrel activity as in Fala at NT 437 609, approximately 1 km to the south of the southern extent of the scheme; 4 km to the west at Keith Glen NT 454 641; and also in Saltoun Forest also to the west at NT 463 658 (no date with this data) (NBN Gateway, 2006). The only dated information regards records at Pencaitland in East Lothian at NT 42 67 (1967) and at NT 441 699 (1984) (NBN Gateway, 2006). Approximately 6 km to the north there is a record (no date) in the area of Oxenfoord Castle grounds at NT 386 655 (NBN Gateway, 2006).

Suitable habitat for red squirrel was noted across the survey area, including coniferous woodlands and copses. Most notable were the Magazine and Fala Gorge Woodlands, which provide the most extensive potential red squirrel habitat within the survey area, due to their high, closed canopies facilitating the easy movement of squirrels between trees without the need to move along the ground and providing suitable sites for drey construction. Pine cones, a main food source of the red squirrel, are also plentiful within these woodlands.

No sightings of red squirrel were made in any of the woodlands surveyed to date. However, squirrel chewed cones were recorded along the south-eastern corner of Magazine Wood, although these could be from grey squirrels known to be present within the survey area. It is considered unlikely that red squirrel is present within the study area at this time and furthermore, that they are unlikely to colonise the area in the short-medium term. This assessment has been made due to a general lack of recent records of red squirrel in close proximity to the survey area and a general lack of connectivity between woodlands within the ecological survey area and those outwith.

This aspect of the study area's ecology is assessed as being of **low** nature conservation importance.

Water Vole

Places of shelter used by water vole, including when not in use, are protected under Section 9, through listing on Schedule 5, of the Wildlife and Countryside Act 1981 (as amended), due to drastic declines in numbers. This makes it illegal to intentionally damage, 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. Water voles themselves are currently not protected, but are listed on the UK BAP and Midlothian BAP.

For water voles the approach was to thoroughly search a strip approximately 5 m wide on each bank of the watercourses within the survey area for signs of water vole activity, in accordance with the standard survey methodology (Strachan & Moorhouse, 2006). Banks with steep sides are most commonly used by water vole, though all areas were searched in this instance. Wider strips were searched where suitable habitat occurred. The survey was conducted at low flow so that the exposed bank side could be carefully searched from the river. Forms of evidence searched for included:

- Sightings of the species itself;
- Tracks / footprints found in soft substrate such as mud along the water-line;
- Droppings and latrines also found along the water-line;
- Burrows, which may be below water or on the bank top;
- Grazed lawns, often associated with the burrows and feeding signs such as piles of cut vegetation.

Any evidence of the presence of other species important to water vole ecology, such as American mink and brown rat *Rattus norvegicus*, which affect water vole via direct predation, was also searched for.

The desk study and consultation exercise returned no records of water vole within the survey area and highlighted the nearest record (1967) of water vole at Temple, approximately 7 km to the south-west at NT 31 58 (NBN Gateway, 2006).

Suitable water vole habitat includes slow-flowing watercourses with tall bank side vegetation, including grasses and sedges, as a food source. Water voles also prefer steep sided earth banks where they can excavate their burrow systems. The survey indicated that there is limited potential water vole habitat present in the area. Isolated areas of potentially suitable bank side do exist, e.g. on the Salters Burn, south of the A68, where the watercourse has been fenced off and bank side vegetation is dense (Target Note 30, Figure 8.3).

No confirmed sightings of water vole or evidence of water vole activity has been recorded to date. American mink has been confirmed as present within the survey area, with footprints recorded near to Marldene (Target Note 21, Figure 8.3) under a small stone bridge. American mink are known to have a negative impact on water vole populations through predation.

It is therefore considered unlikely that water vole are present within the study area and that suitable habitat is both limited and isolated. This aspect of the study area's ecology is assessed as being of **low** nature conservation importance.

Badger

Badgers and their setts are protected under the Protection of Badgers Act 1992 and by Section 11 (Schedule 6) of the Wildlife and Countryside Act 1981 (as amended). It is

illegal to kill, injure, take, possess or cruelly ill-treat a badger or attempt to. Badger setts are protected from interference and it is an offence to obstruct access to, or any entrance of, a badger sett. In addition it is illegal to disturb a badger when it is occupying a sett.

Most recently, the Protection of Badgers Act 1992 has been amended by the Nature Conservation (Scotland) Act 2004. This legislation makes it illegal to knowingly cause or permit an act which will interfere with a badger sett, it includes 'recklessly' killing, injuring or taking an otter as well as 'intentionally', however it removes the references to 'attempt' to kill, injure or take a badger.

The badger is also listed under Appendix III of the Bern Convention, whereby the UK agreed to give special attention to the protection of areas that are of importance for this migratory species and which are appropriately situated in relation to migration routes, as wintering, staging, feeding, breeding or moulting areas.

As badgers suffer from criminal persecution, in accordance with convention any information pertaining to the details of badger setts and signs is presented in a separate Badger Annex to this Environmental Statement (Sensitive Species Report – Badger). The purpose of confidentiality is not to prevent legitimate access to data by an interested third party, so inspection of the Badger Annex is possible by arrangement with TS. This section provides a summary that does not compromise the security of badgers.

Badger evidence was found within the study area and near to some areas of proposed works. Tracks and foraging signs were found adjacent to the proposed alignment, with some commuting corridors crossing the proposed improvement area of the road. No foraging areas were found adjacent to the proposed widening area, though it can be assumed that badgers have access to all areas of the habitat within the survey area. Badger road traffic accidents (RTA's) have been recorded between the southern corner of Magazine Wood and the U60 Longfaugh junction in 2005 and 2006; just south of the U77 junction with the A68 in 2003 and 2005; at the B6458 junction with the A68 in 2007; and at the southern extent of the scheme directly to the south of the Fala Tunnel, in 2002 and 2005.

Badgers are a common and widespread species across Central Scotland and the presence of badgers within the study area is assessed as being of **local** nature conservation value.

Other Mammal Species of Conservation Concern

Brown hare *Lepus europaeus* were recorded in several locations within the survey area, both in woodlands (Target Note 10) and in fields (Target Notes 9 and 15). The habitat within the survey area is considered suitable, with currently sufficient cover and grazing to sustain a population. Brown hare are not legally protected in terms of nature conservation, although they are a UK BAP species due to a dramatic decline in the UK population. As such, based on the results field work, the brown hare population within

the study area is assessed as being of **regional** nature conservation value.

8.3.6 Birds

All wild birds, their nests and eggs benefit from protection under Section 1 of the Wildlife and Countryside Act 1981, as amended. However, certain species of wild bird benefit from a higher level of “special” protection through inclusion on Schedule 1 of The Wildlife and Countryside Act 1981, as amended. These species are often referred to as “Schedule 1 birds”.

The desk study and consultation exercise, including information received from RSPB Scotland, indicated that they were not aware of, and considered it unlikely that, any important bird populations exist within the survey area. As a result, no specific bird surveying has been required as part of the DMRB Stage 3 Environmental Assessment for this proposed scheme. However, as a matter of best practice, consideration of the bird resource of the area has been included within this report.

The only specially protected species of wild bird to have been recorded within the study area is barn owl *Tyto alba*, a Schedule 1 listed species protected under Part 1 of the Wildlife and Countryside Act 1981 (as amended) and an amber listed species (RSPB, 2006). Evidence of barn owl was recorded throughout the survey area with a dead barn owl found on the edge of a recently ploughed field to the south west of Magazine Wood (Target Note 44 on Figure 8.3, NT 41245 62405); a barn owl roost with approximately 15 pellets and droppings in a lime kiln in an un-named strip of woodland directly to the north of magazine wood (Target Note 20, Figure 8.3) and in a mature beech tree to the north-east of the survey area (Target Note 11, Figure 8.3), where feathers, pellets and droppings were recorded.

Other bird species of conservation concern recorded within the survey area include: the red listed yellowhammer *Emberiza citrinella* (Target Note 7, Figure 8.3); a flock of approximately 50 of the amber listed species fieldfare *Turdus pilaris* (Target Note 6, Figure 8.3) often seen in the countryside over-wintering from northern Europe; and the amber listed lapwing (Target Note 29, Figure 8.3) noted in fields to the north-east of the survey area near Salters Road. Chaffinch *Fringilla coelebs* and common buzzard *Buteo buteo* were also recorded within the survey area.

The woodland within the survey area is anticipated to support a number of breeding passerines providing suitable nest sites for a range of common songbirds throughout the bird breeding season. There is also an active carrion crow rookery in the northern section of the mature conifer plantation that borders the layby at Magazine wood. The bird fauna of the study area as a whole can be considered to represent a nature conservation resource of **low** value, although the barn owl population has been assessed to represent a **national** nature conservation value.

8.3.7 Amphibians and Reptiles

Protected UK amphibian and reptile species include great crested newt *Triturus*

cristatus, common lizard *Lacerta vivipara*, adder *Vipera berus* and slow worm *Anguis fragilis*.

The great crested newt is a European Protected Species afforded similar protection to otters and bats (see above). Common lizard, adder and slow worm are listed under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) meaning that it is illegal to deliberately kill, injure, take from the wild or trade in them. The provisions of the Dangerous Wild Animals Act 1976 also prohibit the possession of adders without a licence from an appropriate Local Authority. The great crested newt has a Species Action Plan (SAP) in the Midlothian BAP.

The desk study and consultation exercise reveals that there are no records of great crested newt in the general vicinity of the road improvement scheme, with the nearest being in Dalkeith at NT 36 (1960) approximately 11 km to the north-west (NBN Gateway, 2006).

No suitable aquatic habitat for great crested newt is present within the study area, due to a lack of ponds or marshy areas suitable for breeding and oviposition. No other amphibian species were recorded during surveys although it is likely that common frog *Rana temporaria* and common toad *Bufo bufo* are present.

No sightings, signs or records of slow worm or adder have been made, and although suitable habitat for both species, mainly in the form of woodland edge habitat, is limited within the survey area, adders are known to be widely distributed throughout the Borders and central Scotland. Reptiles are not considered to be an issue with respect to this scheme.

This aspect of the study area's ecology is assessed as being of **negligible** nature conservation importance.

8.3.8 Fish Species

The desk study and consultation exercise, particularly communication with Forth Fisheries Foundation, confirmed that the watercourses within the survey area had not been surveyed and no data was held for any of the burns. The nearest salmonid watercourses are approximately 8 km to the south at the Gala Water (NT 429 501). North of the scheme by 10 km there are records of salmonids in the River Esk in 2002.

During the extended Phase 1 survey fish fry were recorded in deep pools in the Cakemuir Burn, north of the A68 (Target Note 13, Figure 8.2). These were considered to be salmonids, probably brown trout. Other smaller watercourses are considered less suitable for salmonids, due to their ephemeral nature and a lack of passage up the watercourses, but may potentially contain other fish species.

Based on the results of field work, the Cakemuir Burn / Fala Dam Burn system is assessed as being of **regional** nature conservation importance, in terms of potential for salmonid populations to be present, and **low** value for the Salters Burn and other

unnamed watercourses within the scheme extent.

8.3.9 Assessment of Nature Conservation Value

Table 8.5 below summarises the nature conservation value allocated to the key habitats and species assessed as being of significance within the study area. The reasoning behind these categorizations is described above in sections 8.3.2 to 8.3.8. It is against these features of the site and surrounding areas that the assessment of impacts will be made.

Table 8.5. Summary of Key Features of Nature Conservation Value.

Ecological Feature	Nature Conservation Value
Habitat associated with lowland agriculture – Arable	Low
Semi-improved and Improved Grassland	Low
Hedgerows and Walls	Low
Designated Ancient Woodland & Long-established plantation	Regional
Other areas of broad-leaved woodland, mixed plantation and coniferous plantation.	Local
Watercourse habitats	Local
Mines in Hope area	Regional
Habitats associated with built structures (bridges, dry stone walls, lime kilns)	Low to regional
Otter	National
Bats - lime kilns - trees	Regional Low to local
Red squirrel	Low
Water vole	Low
Badger	Local
Brown hare	Regional
General Ornithological Interest	Low
Barn Owl	National
Amphibians & reptiles	Negligible
Fish – Fala Dam Burn / Cakemuir Burn system - Salters Burn and other unnamed burns	Regional Low

8.4 Assessment of Impacts

All potential long-term / permanent ecological impacts relating to the scheme are identified below. Impacts occurring during the construction period which then continue into the operational stage are considered within this chapter, as opposed to being assessed within Chapter 15 (Disruption Due to Construction). This is because

ecological impacts arising during construction often have permanent implications post construction during scheme operation. Impacts which are fully restricted to the construction stage only (short-term / temporary nature) are assessed in Chapter 15 (Disruption Due to Disruption). This is mainly limited to disturbance from increased human, dust and light sources.

8.4.1 Potential Impacts

The following potential (medium to long-term) impacts have been identified and are assessed in detail below:

- Temporary habitat loss.
- Loss of vegetation and habitat resulting from permanent land take requirements.
- Disturbance / damage / fragmentation to wildlife and habitats due to road widening, provision of new access routes and realignment / extension to culverts.
- Increased road-kill of wildlife, due to road widening and increased traffic speeds resulting from the road improvements.
- Changes to water quality of watercourses.

8.4.2 Characterisation and Significance of Impacts

Temporary habitat loss

Temporary land take will be required during the construction period for the creation of site compound facilities for the storage of plant equipment and materials, and site staff.

The location of the compound will be sited in an area with due consideration given to safety and traffic management for the scheme, and will be agreed by the Engineer prior to erection. The most valuable habitats within the site (i.e. areas of woodland, the Salters Burn and Fala Dam Burn) will be avoided and therefore the site compound will be located well away from the banks of these and other watercourses within the survey area. Areas of woodland, considered as being of regional to local nature conservation value should also be avoided. The compound will be located within an area of arable / improved / semi-improved grassland, and therefore, although the magnitude impact is considered to be medium, the impact significance is assessed as **negligible** adverse and not significant.

The working corridor will be limited to that essentially required for scheme construction. It is intended that construction vehicles will be restricted to within the working corridor and there will be no other temporary land take.

Loss of vegetation and habitat resulting from land take requirements

In accordance with best practice, a number of scheme options have been considered during previous environmental assessment (e.g. DMRB Stage 2 Assessment), as described in Chapter 2. During Stage 3 DMRB assessment, through the refinement of the preferred scheme option, the loss of and impacts on significant ecological features of the study have been minimised. This has resulted in a scheme with land take restricted largely to that adjacent to the existing road and junctions, with additional land take required for the construction of a new field access towards the northern extent of the scheme, the alteration of the U60 Longfaugh junction, the construction of a new side road linking the A68 to the U77 Fala Dam road and the clearance of an area of trees and shrubs to provide increased visibility for the scheme tie-in at its northern extent.

The small areas of farmland habitat (improved and semi-improved grassland and arable land) affected have been assessed as being of low nature conservation value, comprising poor quality hedgerow and stone built wall and agricultural land. The collective loss of small areas of these undesignated, common and widespread habitats is an impact of medium magnitude and therefore considered to be of **negligible adverse** significance.

Sections of poor quality hedgerow and stone built wall will be lost due to the widening of the road in several places. The hedgerows and walls have been surveyed and are largely considered to be of low value due to their species poor nature and poor condition, particularly towards the northern extent of the scheme. A limited number of scattered trees, of local value, adjacent to the existing carriageway way will also be lost. The loss of sections of hedgerow, wall and scattered trees will result in an impact magnitude of medium and an overall impact significance of **negligible to minor adverse** and not significant.

An area of mature commercial coniferous plantation along the western edge of Magazine Wood, directly adjacent to the current layby on the south bound carriageway, will be removed in order to facilitate the construction of the new field access and counteract the threat of wind-blow. The area of woodland to be removed has been assessed as being of local nature conservation value. Due to fact that the precise boundary of the extent of the Magazine Wood long-established plantation is not known, the area of woodland to be felled may overlap with this designated area, which is assessed as being of regional nature conservation value, and supports an active carrion crow rookery. The loss of a small area of long-established plantation at the edge of the site is an impact assessed as being of medium magnitude resulting in a **moderate adverse** and significant impact.

A very small amount of habitat will also be lost from and directly adjacent to the Salters Burn where it passes beneath the existing A68, as part of the necessary widening of A68 and the extension of the culvert through which the Salters Burn passes. The Salters Burn is not part of any designated nature conservation site and the watercourse habitat itself, as well as the adjacent habitat in the vicinity of the A68, is unremarkable, e.g. no presence of vegetative features of interest, and has been assessed as being of

local nature conservation value. Loss of small amounts of this habitat will not therefore directly affect nature conservation value and with a low magnitude, this overall impact is assessed as **minor adverse** and not significant.

Disturbance / damage / fragmentation to wildlife and habitats due to road widening, provision of new access routes and realignment / extension to culverts

The scheme is largely limited to on-line improvements within or immediately adjacent to the existing A68 and its junctions within the survey area. However, the widening of the A68 carriageway, the culvert realignment / extensions required where the Salters Burn passes beneath the A68, and where two un-named burns / field drains pass beneath the A68 near the centre of the scheme; as well as the construction of the new side road joining the A68 to the U77 Fala Dam road, will result in a degree of disturbance / damage / fragmentation to wildlife and habitats.

No demolition works are required in relation to this scheme. Residential buildings and the lime kilns within the survey area will be unaffected by the road improvements. The area of mature coniferous plantation to be removed at the eastern end of Magazine Wood, in order to facilitate the new field access, is directly adjacent to the lime kiln within Magazine Wood. However, it is anticipated that the lime kiln will be unaffected by the works.

As mentioned above, the culvert through which the Salters Burn passes underneath the existing A68 will require extending in order to accommodate widening of the A68; another smaller culvert, will be replaced near the centre of the scheme at the B6458 Tynehead Junction, where a watercourse flows under the A68. This watercourse will also be culverted on the opposite side of the A68, where it will flow under a new road being constructed between the U77 and the A68. The actual culverts are of negligible conservation value and as such any works to the culverts are assessed to have an impact of low magnitude and therefore considered to be of **negligible adverse** significance.

Although once the culvert extensions and replacement are complete otter movement along the watercourses and through these structures will not be compromised, there is a possibility that construction works could result in partial barriers to otter movements along these watercourses, with otter routes displaced onto the banks of the burns or possibly further inland, or potentially be prevented from passing along the watercourses altogether. As the works are only for a limited time period, will comprise of temporary realignment of watercourses and because levels of otter activity are not especially high, with no holts identified on the watercourses to be affected, the magnitude of such an event is assessed as low and therefore considered to be of **moderate** adverse significance without mitigation.

Measures have been incorporated into the design of the culverts to be extended and replaced, i.e. otter and badger ledges to facilitate the passage of mammals. The design of the ledges will be detailed at the construction design stage, but will follow

standard otter / badger requirements and are likely to comprise of steel fitted or concrete structures. The potential effect of the completed scheme (with realigned and extended culverts and ledges in place) on the passage of mammals, is assessed as an impact of imperceptible magnitude and therefore considered to be of **minor adverse** significance in the long term. The realigned / extended culverts will also meet with the requirements for fish passage and therefore no permanent fragmentation will result.

Due to the mainly on-line nature of the proposed A68 road improvements, it is anticipated that there will be no significant fragmentation of badger habitat than currently exists. There would be a minor increase in habitat fragmentation, due to the new side road link to the U77 just north of the junction of the A68 with the B6458 (see Badger Annex Figure 2c). However, this will entail the provision of a relatively narrow low trafficked link which will be passable to badgers. The magnitude of fragmentation / disturbance impact on actual habitat is considered to be low and of **minor adverse** significance.

No active badger setts, as described in the separate Badger Annex, will be directly affected by the proposed road scheme, although one disused, collapsed / filled in sett was present within 30m of the B6458 junction / A68 and will require monitoring. Two outlier badger setts were identified close to the route alignment during the Stage 2 assessment, however for reasons discussed within the Badger Annex, these setts are no longer considered to be at risk from the development. The scheme involves the loss of a very small amount of agricultural land that badgers may use for foraging. Given the quantity of alternative foraging sites and low activity adjacent to the existing A68 within the scheme, this is deemed to be an impact of imperceptible magnitude and thus to represent a **negligible adverse** and insignificant impact for the purposes of this EclA.

A possible otter holt recorded on the burn that passes under the A68, near to the existing B6458 junction, during the 2004 survey, has subsequently been ruled out as an active otter holt. No holts shall be lost due to the road improvement scheme and as such this is deemed to be an impact of imperceptible magnitude and thus to represent a **negligible** and insignificant impact for the purposes of this EclA. Fragmentation is not considered to be an issue for the completed scheme for the reasons discussed above, i.e. ledges incorporated into the design of the culverts to be extended and replaced to facilitate the passage of mammals.

Built structures, including the other lime kilns identified to the east of the A68 and residential properties throughout the survey area, which have been assessed as providing suitable habitat for roosting bats, will not be directly affected by the development.

In the centre of the scheme, the proposed road widening over the Salters Burn occurs very close to an area of the watercourse identified as providing habitat potentially suitable to water voles, although no evidence of water vole has been found. It is not possible to entirely rule out the future occupation of water voles at this location, but as

water voles are not currently present, no impact is predicted.

Although road deaths are known to account for a significant proportion of barn owl mortality, particularly of young birds, the impact of the scheme on the general ornithological interest of the survey area, in terms of fragmentation and disturbance, over and above the existing fragmentation and disturbance caused by the current road network, is considered to be of imperceptible magnitude and so constitutes a **negligible to minor adverse** and not significant impact in terms of this EclA.

Increased road-kill of wildlife, due to road widening and increased traffic speeds resulting from the road improvements

As the baseline surveys and consultation exercise confirm, there are three established badger crossing points of the A68 along the scheme extents. These are located between the southern corner of Magazine Wood and the U60 Longfaugh junction where badger road traffic accidents (RTA's) were reported in 2005 and 2006; in the vicinity of where the A68 crosses the Salters Burn where badger RTA's were reported in 2003 and 2005; and at the southern extent of the scheme, directly to the south of the Fala Tunnel where badger RTA's were reported in 2002 and 2005.

Without mitigation, badgers will be at increased risk of road-kill due to road widening and increased traffic speeds. This impact has been assessed as being of high magnitude resulting in a **moderate adverse** and significant impact. Therefore, mitigation is required to reduce the risk of badger injury / mortality during the operational stage of the scheme.

There are two undated records of otter fatalities, received from the Edinburgh and Lothians Badger Group, within the study area in the vicinity of the Fala Tunnel, confirming that otter are at least intermittently crossing the A68 at this point. However, it is considered that otters are more likely to pass through the Fala Tunnel and under the A68, than directly across the carriageway; and as the exact location of these otter casualties is unknown, it is unlikely that there will be an increased risk of otter road casualties at this location, due to road widening and increased traffic speeds within the scheme extent. The impact of road widening and increased traffic speeds on the risk of otter road mortality is assessed as being of imperceptible magnitude resulting in a **minor adverse** and not significant impact in terms of this EclA.

A widened carriageway, combined with increased speeds along sections of the road, may result in higher levels of general wildlife casualties in the absence of mitigation; however the scheme is not predicted to result in an increase in traffic volumes using this section of the A68. Whilst an increase in average speed has some potential to result in higher levels of wildlife casualties, the scheme involves widening and straightening the road, and altering the vertical alignment in order to improve driver sightlines, which may afford drivers greater opportunity to avoid animals that do cross the carriageway. The impact of the scheme on the general fauna (non protected species) in the study area, which is of low to regional value, over and above the

existing risk to wildlife along the scheme from the current road network, is considered to be of imperceptible to low magnitude and so constitutes a **negligible to minor**, i.e. not significant impact in terms of this EclA.

Changes to the water quality of watercourses

Under the terms of the Water Framework Directive (WFD), high quality watercourses cannot be allowed to deteriorate in terms of water quality and the future objective set out in the directive is to achieve 'good' status in all watercourses.

A detailed assessment of water quality is provided within Chapter 13 (Road Drainage and the Water Environment). With respect to ecology, the scheme, including engineering structures that are required to cross watercourses within the survey area, has been designed to protect the status of the watercourse as far as possible.

Currently, the drainage of the existing road comprises surface water run-off to the Salters Burn and Cakemuir Burn via a positive drainage system (direct piped system of kerbs and gullies).

Although not covered by any nature conservation designations, the watercourses do support faunal populations of international significance (otter), and are generally assessed to be of good water quality. In the absence of mitigation, culvert widening will cause disturbance to aquatic and riparian habitat along the Salters Burn corridor and the two un-named watercourses over which the A68 passes and adjacent bank side areas, in addition to downstream areas.

Pollution to watercourses within the survey area could occur through the discharge of untreated run-off from the construction site, through, for example, heavy rainfall during soil stripping and ground excavations. It could also occur through accidental spillage of materials into watercourses. There are three structures crossing watercourses within the proposed road improvements that will require construction works. These are the extended culverts on the Salters Burn; an unnamed watercourse in the centre of the scheme; and the replacement to the culvert in the vicinity of the Tynehead junction.

Site run-off may be high in suspended solids or contain other construction site pollutants such as fuels, oils, and concrete materials. The transport of suspended and deposited sediment can have both acute and chronic adverse effects on juvenile salmon and trout. Physical disturbance to watercourses and pollution may potentially impact on water quality and aquatic habitat, in particular invertebrates, fish, floral species (present within the immediate river channel and further downstream) and terrestrial species feeding in these areas, such as otter. As otter are of international value and the magnitude of the impact could potentially be medium negative magnitude; this is assessed as being of **major** adverse significance.

Other than the accidental release of contaminants into the watercourses, potential impacts on the water resources within the study area may result through the increased volume of surface water runoff into receiving waters. This has the potential to release

particulate matter, materials derived from rubber tires and fuel, and other contaminants into the burns; and cause disturbance to aquatic life, including fish and aquatic invertebrates. Such impacts could potentially be of medium magnitude, and therefore result in a **minor to moderate adverse** significance.

8.5 Mitigation

8.5.1 Significant Impacts

A total of four significant impacts have been identified (described below). The following mitigation has been identified in order to reduce the level of each impact:

The potential loss of an area of long-established plantation

As part of the scheme design, an area of mature coniferous plantation along the eastern edge of Magazine Wood, directly adjacent to the current layby on the south bound carriageway, will be removed in order to facilitate the construction of the new field access. An area of long-established plantation, assessed as being of regional nature conservation value, will potentially be affected by this felling.

The exact extent of the long-established plantation will be ascertained and felling of trees forming part of this plantation will be avoided if possible. Felling within the area of mature coniferous plantation directly adjacent to the long-established plantation will also be kept to a minimum. Felling will only be carried out once carrion crows have finished nesting activities at the active rookery, identified within the area of woodland to be removed, and once a small number of trees have been subjected to a closer inspection to rule out the presence of roosting bats. The loss of the trees will be offset by the replanting of trees in the vicinity of Magazine Wood and in other areas throughout the scheme extent.

By incorporating these measures, the residual impact will be reduced to low magnitude with an overall impact of **minor adverse** and insignificant.

Disruption to otter and badger during construction phase

In order to minimise the risk of otter impediment, the contractor will ensure that otter routes are not disturbed if possible and that there are no blockages to movement. This will assist in avoiding these protected mammals being forced to cross the A68. The construction works will also be restricted to daylight hours wherever possible to avoid peak times for otter and badger activity. Structures crossing watercourses will be installed in a sensitive manner to ensure no blockage of the water channel. A system will also be set up so that if any mammal road casualties are observed within the scheme extent during the extension works, this will be reported to the relevant person (such as ecological clerk of works / site ecologist); works will stop immediately and temporary measures put in place to safeguard against further road casualties (such as the erection of professional temporary mammal fencing along the appropriate verge / refined construction procedure to improve natural animal movement under the bridge).

This will help to reduce the impact of the construction works to imperceptible magnitude and **minor** adverse and insignificant.

Impact of widened carriageway and increased traffic speed on badgers and otters at identified crossing points

As part of the scheme design (and shown on Figures 9.4 and 9.5, mammal mitigation including combined badger / otter ledges allowing the passage of badgers will be incorporated within the widened Salters Burn culvert and the replaced culvert in the vicinity of the B6458 Tynehead Junction. A combined mammal tunnel / underpass will be located between these two culverts. The design and gradient leading to the ledge will follow current best guidance / DMRB Volume 10 and meet with SNH approval.

Combined badger / otter ledges will be attached to the interior of the realigned culvert on the unnamed burn at the B6458 Saughland junction with the A68 (see Figure 9.5) and the new culvert on the unnamed burn further downstream. A ledge will also be incorporated within the extended Salters burn culvert (see Figure 9.4). The ledge is likely to comprise of a walkway which will measure 500 mm in width and provide 600 mm of headroom clearance. It will comprise of either a concrete ledge or aluminium sheeting bolted / fixed securely to the culvert wall at a height of at least 150 mm above high flow levels. The ledge will have ramp structures at both ends which will comply with a 1:3 gradient slope. The ramps will be extended far enough out onto the bank to ensure that access to the ledge can be obtained during periods of high flows.

A dedicated mammal underpass will also be provided as shown on Figure 9.5. This will comprise a concrete pipe of 600 mm diameter. A break in the landscaping provision will be made at the entrances to the underpass so that they are more visible. This location has been chosen for the underpass as there are embankments on both sides of the road which allow the tunnel to be constructed in a horizontal position with visibility along its entire length, rather than cranked at one end, which would be the case further along the A68 where the land rises up to the west of the A68.

As shown on Badger Annex Figures 2b and 2c, associated badger fencing will be erected on either side of the widened A68 road corridor, designed to focus badger movements towards the newly passable culverts and underpass. The fencing will meet current approved standards and be erected in the appropriate manner. The design and extent of fencing will be detailed in consultation with SNH during the detailed landscape design of the scheme. The standard design currently used (DMRB Volume 10) comprises of a post and rail fence of 1500 mm in height. The fence will be covered in a mesh of 50 mm by 50 mm galvanised steel, which will also be buried 300 mm vertically below the ground level and include a 300 mm horizontal return. The top of the fence will also include a overhang, angled at 45 ° out from the fence.

By incorporating these mitigation measures the residual impact will be reduced to imperceptible magnitude with an overall impact of **negligible adverse** and insignificant compared to existing baseline conditions. Indeed, with the provision of the mammal

underpass and ledges within culverts, the risk of badger RTAs will be reduced within the scheme extents.

No badger mitigation is currently planned for the area immediately south of the Fala Tunnel where casualties have been recorded in the past, however this is beyond the scheme extent. It is unlikely that the scheme will result in a significantly increased risk of badger road casualties at this crossing point, over and above the existing risk to badgers from the current situation.

Potential impact of felling scattered trees upon roosting bats

Although no bat roost sites were identified during the surveys to date; trees with features potentially capable of supporting roosting bats, and habitat suitable for use by foraging bats, are present throughout the survey area. Although few trees, other than those identified at the western edge of Magazine Wood, are likely to be affected by the works, as a precautionary measure, a pre-felling survey should be completed (by a licensed bat worker / suitably experienced ecologist) immediately prior to the removal of any trees. Where trees displaying features of potential use to roosting bats are identified and need to be removed due to the possible presence of bats, reasonable avoidance measures should be employed. These will include the following;

- All trees scheduled for felling will be inspected at close quarters from the ground, with the use of binoculars, and those which contain potential roost features will be marked. All potential roosts will be checked with the use of an endoscope for the presence of bats by a licensed bat ecologist, immediately prior to felling the tree. Access to potential roosts will be gained through the use of a cherry picker.
- All marked trees will preferably be felled during periods when bats are less susceptible to disturbance, i.e. during suitable weather conditions in the months of September / October or mid-March to mid-May. This, however, may not be possible due to the timeframe allowed for the road construction program.
- All sections that contain potential roost features will be soft felled. This will involve wedging open splits or cracks to prevent them from closing and not cutting through cavities. These sections will be roped down to ensure that any hidden bats remain unharmed.
- Felled sections that contain potential roost features will be allowed to remain undisturbed on site, or within the adjacent woodland, for 48 hours to allow any hidden bats to escape.
- A licensed bat ecologist will be in attendance during felling operations. If bats are discovered at any time all work must cease and discussions held with the SEERAD and SNH to confirm whether a European Protected Species Licence will be required to allow construction works to proceed.

By incorporating these additional pre-felling surveys and reasonable avoidance measures where appropriate, the residual impact will be reduced to an imperceptible magnitude, with an overall impact of **minor adverse** and not significant.

Potential impact of increased runoff and accidental spillage of contaminants upon Water Quality

Under the Water Framework Directive and the newly adopted Water Environment (Controlled Activities) (Scotland) Regulations 2006, there is a legislative requirement for engineering works within watercourses to be subject to a licence issued by SEPA, and this in turn requires that strict environmental protection measures will be implemented during both construction and operational phases of the proposed development. Further details on this aspect are given in Chapter 13 (Road Drainage and the Water Environment).

In order to reduce the risk of pollution during construction, the contractor will work in accordance with SEPA's Special Requirements and Pollution Prevention Guidance (PPGs) in addition to the requirements of the agreed Construction Method Statement. The contractor will also be required to produce and implement an EMS (as identified in Chapter 2) prior to the commencement of work on the site. Mitigation measures to be included in an EMS will include, but not be limited to:

- Appropriate storage and containment of site materials to prevent pollution to aquatic and terrestrial habitats and species (designation of specific sites for these materials);
- The use of appropriate site drainage / temporary drainage so that any surface water run-off is contained and treated prior to discharge to the receiving watercourse (installation of adequate temporary treatment facilities such as settlement ponds and filtration systems);
- Use of best practice construction methods (e.g. no cleaning out of concrete wagons / pipework on the site, dust suppression etc.);
- Incorporation of an Emergency Pollution Contingency Plan detailing the system for dealing with emergency spillage or other pollution incidents. This will include the procedure for reporting and contact details for the site manager / responsible environmental engineer and SEPA; and
- Adherence to the contents of CIRIA C648 'Control of water pollution from linear construction projects – technical guidance' (2006) and other current documentation outlining best practice.

It is anticipated that by following the above mitigation measures, the residual impact will be reduced to imperceptible adverse and **negligible to minor** significance.

In accordance with best practice, an integral part of the scheme design is that run-off to the system of watercourses within the survey area, during the post-construction and operational stages of the scheme, will be treated using a Sustainable Drainage System (SuDS) scheme. Increases in run-off and containment of contaminants will be ensured through a managed road drainage scheme, with attenuation and treatment of drainage (see Chapter 13 Road Drainage and the Water Environment) and would be a statutory requirement, as drainage discharges are subject to a statutory regulatory regime.

The use of SuDS will assist in reducing the residual impact to imperceptible magnitude and therefore an overall impact of **negligible adverse** and not significant.

8.5.2 Application of Best Practice

In addition to identifying suitable mitigation measures for specific significant impacts, the best practice measures identified below will be applied in order to reduce insignificant impacts as far as possible. This is not an exhaustive list, but presents the main elements relevant to this particular scheme.

Maximising Biodiversity Value

Ecologists have been, and will continue to provide input to designs for new drainage arrangements and site landscaping, to ensure that opportunities are taken to maximise the ecological value of new habitats created by the proposals. It is important to ensure that biodiversity enhancement proposals are appropriate to the locality and the existing interest of the surrounding area. Planting will follow the guidelines available from 'Forests and Water Guidelines' (Forestry Commission, 1988) and 'Forestry Authority Bulletin 112: Creating New Native Woods' (Rodwell and Patterson, 1994).

Protection of Water Quality

Methods of working will be adopted (as per the Construction Method Statement, EMP and CAR licence) and surface water run-off will be controlled in accordance with best practice to mitigate potentially polluting activities. This will include ensuring that any discharge to watercourses does not directly enter the river system during construction or scheme operation, but is first treated and attenuated. Such measures are discussed in Chapter 13, Water Quality and Drainage, as well as above, and will be further detailed as the design of the scheme progresses but will primarily comprise filter drains, swales and two attenuation ponds located directly adjacent to the south bound carriageway, in the vicinity of the Salters Burn (Figures 13.4 – 13.9).

Monitoring Change

Although protected species are present along the road corridor and surveys to date have found badger setts and evidence of otter on the watercourses within the survey area, these were not located within areas to be lost or damaged. However, the use of the site may change over time because the species concerned are mobile. Lack of

evidence at any one time does not preclude them being present on site in the future. It is therefore recommended that protected species surveys, including for otters, bats water voles and badgers, will be undertaken in the correct survey season prior to the commencement of works on site. In this way, if protected species have changed their use of the site, and / or require licensed mitigation in order for the scheme to proceed, this can be planned for and the requirements of the legislation taken into account in planning the works.

Pre-construction surveys to check for non-native invasive plant species will also be required in order that measures may be set in place for appropriate control and / or removal during the construction phase, if necessary.

Mitigation Strategies and Obtaining Licences

Where pre-construction surveys indicate that there will be impacts on protected species of animal and plant, detailed mitigation schemes will need to be agreed with SNH and / or the Scottish Executive (depending upon the species concerned) and appropriate licences obtained before works to disturb those species / habitat can be lawfully implemented by the Contractor.

On the basis of survey information gathered by YA between 2004-2007, a European protected species development licence for otter may be required to cover works throughout the site, as there is a risk of disturbance to otter since they are frequently present throughout the watercourses within the study area. This will be discussed further with the Scottish Executive once the construction method statements are produced. Other measures to be put in place will include those that were adopted during the ground investigation works (including pre-construction survey to confirm breeding status, appropriate safeguarding and working hours).

Planning Construction Compound and Storage Areas

Decisions on the location of storage and construction compounds will be made by the Contractor in consultation with a suitably experienced ecologist, to ensure that habitats or species of nature conservation value are not adversely affected. The site compound will be located away from the Salters Burn or any other watercourses within the scheme extents. Areas of ground disturbed by temporary offices / plant / hard standing and other construction activities will be restored to their pre-disturbance condition.

Maintaining Habitat Links

Habitat links are required in order to facilitate the safe crossing of the road by species of conservation significance, but also including all species, specifically those using the aquatic, riparian corridor of the Salters Burn. The detailed design of the landscaping in this area will be undertaken with input from suitably experienced ecologists, to ensure that planting of trees and shrubs does not channel species using these sheltered habitats into the path of traffic using the elevated section of the road above. Planting will include the re-instatement of the hedgerows; planting of trees and shrubs along the

verges; and planting of riparian species of tree, e.g. willow along the banks of the Salters Burn.

Biodiversity Enhancement Through Habitat Creation

Infrastructure developments through agricultural habitats often provide opportunities for biodiversity enhancement and linear habitat creation in the form of ecologically sensitive design of features such as balancing ponds and soft landscaping within the highway boundary.

The new attenuation ponds being created as part of the drainage management system for the scheme (Chapter 13 (Water Quality and Drainage)) represent a contribution toward the nature conservation resource of the local area, as these features will become established and can be expected to develop nature conservation interest within the short- to medium-term. The planting of rush species will take place within the attenuation ponds in order to aid with filtration, but the remainder of the ponds will be left unplanted to allow a natural process of colonisation (the species and detailed design is a matter for discussion between consultees and the Contractor at the final design stage).

Planting within the scheme boundary to include broad-leaved tree species native to the local area, and the re-instatement of a locally native species rich hedgerow on either side of the carriageway will maintain and improve woodland and hedgerow links. Elsewhere, there will be opportunities to utilise species-rich native grass seed mixes when re-seeding new areas of embankment. Further details of the proposed landscape tree and shrub planting can be found in Chapter 9 (Landscape and Visual). Further detail of the planting design will become available at the detailed design stage, once exact areas of cutting and embankment and planting are defined.

Definition of Working Areas

The working areas, including temporary access tracks, will be kept to a practical minimum through areas of vegetated habitat, and their boundaries will be clearly delineated at the commencement of works. An ecologist will be consulted in decision making regarding areas proposed for use as construction compounds or site storage areas, so that sensitive habitats are avoided wherever possible.

Protective Fencing

Existing vegetation is to be retained and stands of invasive species or other sensitive areas such as ditches defined in the EMP as requiring protection from accidental damage or disturbance will be securely fenced prior to the commencement of site clearance. The area enclosed within the fencing will include the root systems of the vegetation affected. Fencing will be fit for purpose ("Netlon" or similar is not suitable) and be clearly visible to drivers of large construction vehicles. Storage of materials will not be permitted within the fenced areas. The fences will be maintained to ensure their continued function throughout construction, but will be removed from site on completion of the works.

Control of Invasive Species

Further checks for Japanese knotweed, and other non-native invasive plant species will form part of the EMP and will be carried out in accordance with the requirements of SEPA (to be set out within the EMP in accordance with the most up-to-date recommendations).

Planning to Minimise Risk of Nuisance

Good construction site management (e.g. controlled litter collection, dust control, switching off of noise and vibration sources when not in use, etc.) will be implemented to avoid / minimise generation of excessive litter, dust, noise and vibration. This will be controlled and monitored through the Contractor's EMP.

Ground Preparation and Restoration

Where present, topsoil should be removed and stored separately from the underlying subsoil in piles less than 3 m high. Topsoil, in particular, should be stored for as short a time as possible. When ground affected by construction works is being restored, subsoil should be placed beneath topsoil, and steps taken to ensure that the new surfaces will settle so as to be flush with the surrounding ground level.

Minimising Potential for Impacts on Breeding Birds

The nests, eggs and young of all species of wild bird are protected from damage or disturbance during the breeding season (March to August inclusive) under the terms of the Wildlife and Countryside Act 1981, as amended. It is best practice to minimise the potential for such damage by removing vegetation likely to be used by breeding birds outside of the breeding season as well as completing works on any structures at this time, which may also provide nesting opportunities.

Minimising Potential for Construction Impacts on Otters (and Badgers)

Construction activity must not limit the free movement of otters / badgers across the site. Areas of sensitivity, such as holts (and setts), will not be directly illuminated. Vegetation will be retained as far as practicable along the Salters Burn where it is affected by culvert widening, so that an element of cover is provided along this corridor. Open trenches will either be covered or ramped in at least one location to provide a means of escape in case of animals falling in (in practice, measures to prevent excavations from being a risk to children and pet animals will achieve the required level of protection).

Measures will be put in place to ensure that mammal underpasses and fencing are checked and maintained as appropriate, on an ongoing basis.

In addition to the above measures, a monitoring programme will be established to assess the effectiveness of the mammal crossing measures put in place. In

accordance with advice given in DMRB Volume 10, this will include a weekly visit for 4 weeks following scheme completion and then again after 6 months and after 1 year. This monitoring programme will be implemented through the contract documentation.

Additional post-construction monitoring may be required in respect of any protected species mitigation carried out under licence, and the nature and timing of such monitoring will be agreed between the Contractor and the relevant authorities at the time when the licence is applied for.

8.6 Residual Impacts

The above mitigation measures will result in the minimisation of adverse ecological impacts arising from the A68 Pathhead to Tynehead Improvement Scheme, and the maximisation of any biodiversity benefits arising from implementation of the scheme. Table 8.6 provides a summary of all the potential ecological impacts identified; the pre-mitigation magnitude and significance of these impacts and where appropriate; and the post mitigation magnitude and significance of residual impacts.

Table 8.6. Summary of Potential Ecological Impacts Identified and Pre- and Post-Mitigation Magnitude and Significance of Impacts.

Predicted / Potential Impact	Pre-mitigation magnitude and significance of impact	Post-mitigation magnitude and significance of residual impact
Temporary habitat loss during construction period	Medium adverse magnitude and negligible significance.	Medium adverse magnitude and negligible significance.
Temporary disturbance to active otter holt identified on the Cakemuir Burn during construction period.	Imperceptible magnitude and minor significance.	None predicted
Temporary disturbance to badger foraging during construction.	Low magnitude and minor significance.	Imperceptible magnitude and negligible significance.
Potential disturbance to roosting bats in lime kiln due to felling of trees at Magazine Wood.	Low magnitude and minor significance.	Low magnitude and minor significance.
Disturbance to roosting bats if within trees at Magazine Wood and other scattered trees that require felling.	High magnitude and minor to moderate significance.	Imperceptible magnitude and minor significance.
Temporary dust pollution to surrounding vegetation during construction period.	Low magnitude and negligible to minor significance.	Imperceptible magnitude and negligible significance.
Temporary disturbance to nocturnal species from extra lighting during construction period.	Imperceptible magnitude and minor significance.	Imperceptible magnitude and minor significance.
Loss of poor quality hedgerow and stone built wall.	Medium magnitude and negligible to minor significance.	Imperceptible magnitude and negligible significance.
Loss of scattered trees.	Medium magnitude and minor significance.	Imperceptible magnitude and negligible significance.
Permanent loss of small areas of	Medium magnitude and	Medium magnitude and

Predicted / Potential Impact	Pre-mitigation magnitude and significance of impact	Post-mitigation magnitude and significance of residual impact
agricultural habitats.	negligible significance.	negligible significance.
Loss of an area of mature coniferous plantation and potentially a small area of long-established plantation.	Medium magnitude and moderate significance.	Low magnitude and minor significance.
Permanent loss of small sections of watercourse where culverts extended / realigned, particularly on the Salters Burn.	Low magnitude and minor significance.	Low magnitude and minor significance.
Temporary disturbance to otter movement along watercourses during works to culverts.	Low magnitude and moderate significance.	Imperceptible magnitude and minor significance.
Disturbance to general wildlife due to fragmentation.	Low magnitude and minor significance	Imperceptible magnitude and minor significance
Fragmentation / disturbance to badger habitat.	Low magnitude and minor significance.	Low magnitude and minor significance.
Impact on badger setts.	Imperceptible magnitude and negligible significance.	Imperceptible magnitude and negligible significance.
Impact on general ornithological interest of the survey area.	Imperceptible magnitude and negligible significance.	Imperceptible magnitude and negligible significance.
Increased risk of badger road casualties due to road widening and increased traffic speeds.	High magnitude and moderate significance.	Imperceptible magnitude and negligible significance.
Increased risk of otter road casualties due to road widening and increased traffic speeds.	Imperceptible magnitude and minor significance.	Imperceptible magnitude and minor significance.
Increased risk of general wildlife road casualties due to road widening and increased traffic speeds.	Imperceptible to low magnitude and negligible to minor significance.	Imperceptible to low magnitude and negligible to minor significance.
Physical disturbance / pollution of watercourses and impact on aquatic habitat and water quality.	Medium magnitude and major significance.	Imperceptible magnitude and negligible to minor significance.
Pollution to watercourses due to the increased volume of surface water runoff into receiving waters during the operational period.	Medium magnitude and minor to moderate significance.	Imperceptible magnitude and negligible significance.

As indicated above, the overall residual impacts (after the implementation of the mitigation) will result in no significant impacts.