

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 South Soutra and Oxton. This section then provides an Ecological Impact Assessment (EclA) of the potential impacts arising from the proposed scheme on the ecological interest within and adjacent to the proposed route alignment. Potential impacts have been determined through consultations (Stage 1, 2 and 3), review of previous scheme reports (YA, 2004; YA, 2005) and ecological field surveys. Where significant impacts are identified, mitigation measures are proposed in order to minimise the level of any adverse impacts while maximising the biodiversity value of the new habitats created by the improvement scheme. 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 an assessment of the residual impacts.

8.2 Methods

The methodology followed for this Ecological Impact Assessment (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/AMEC from a review of the most up to date guidance documents at the time of report production (as explained in Appendix 6).

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 preferred 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 previous road improvement proposals for the A68 between Soutra South and Oxton have recently undergone DMRB Stage 1 and 2 assessment (as summarised in Chapter 2), 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 Soutra South to Oxton Improvement Scheme. Stage 2 Report Part 1 Environmental Assessment, November 2005 (YA, 2005).
- A68 Soutra South to Oxton Improvement Scheme. Draft Stage 2 Report Part

2 Engineering, Traffic and Economic Assessment, February 2005 (Mouchel Parkman, 2005).

- A68 Soutra South to Oxton Improvement Scheme. Stage 1 Environmental Update Report. Final Report. May 2004 (YA, 2004).

In order to update this information, including any additional areas not included within original proposals at Stage 1 or 2 (e.g. re-alignment of the D47/5 & A68 Junction), obtain the consultees' opinions on the scope of work for the current Stage 3 assessment and their preliminary views on potential impacts and mitigation, updated consultations on the preferred scheme were completed in August 2005 with the following organisations:

- Scottish Badgers;
- SBC;
- SEPA;
- SE;
- SNH; and
- Tweed Foundation/River Tweed Commissioners.

All of the consultees contacted with respect to ecology throughout the DMRB process are listed within Chapter 4 (Consultations) and Appendix 1.

Subsequent to this consultation exercise in August 2005, a new side road linking the C83 and C84 was added to the scheme design. Further consultations were therefore undertaken with SNH, SEPA, SBC, HS and RTC in July 2007 since the design change may have influenced their previous response. The responses are included within Appendix 1 and no new issues were identified at this time. As the new side road involves a new bridge crossing of the Headshaw Burn, a site visit was also held with SEPA and SNH in September 2007.

8.2.2 Field Survey

Extended Phase 1 Habitat Survey

The study area was subject to an extended Phase 1 habitat survey, completed in April 2004 and again in July 2005, focusing on land and watercourses up to approximately 500 m either side and at each end of the scheme (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, 2007 reprint). 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.

Whilst 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 surveys for badger (*Meles meles*), otter (*Lutra lutra*), water vole (*Arvicola terrestris*), red squirrel (*Sciurus vulgaris*) and bat were carried during April 2004 (extended Phase 1 habitat survey comprising incidental records of faunal species) as part of the DMRB Stage 2 assessment, with detailed species-specific surveys (in-depth, thorough surveys) completed during July, August and October 2005. These species-specific surveys followed the recommendations within the Stage 2 Environmental Report, focusing particularly on badger, otter, bat and water vole (Table 8.1). Surveying was completed by experienced and fully qualified ecologists and followed recognised standard methodology (see Appendix 8 for details) 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.

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 (SNH/RSPB have not requested any specific bird surveys through consultations and these were professionally not deemed necessary).

Table 8.1. Stage 3 Species-Specific Surveys Carried Out 2004 – 2005.

Species	Status (Highest Level)	Survey Date
Otter	European Protected Species	July, August and October 2005
Bat	European Protected Species	September 2005
Water vole	Scottish Protected Species (places of shelter)	July and October 2005
Red squirrel	UK Protected Species	July and October 2005
Badger	UK Protected Species	July and October 2005

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, 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 8 2007: Environmental Impact Assessment (Scotland) Regulations, 1999;
- Institute of Ecology and Environmental Management. Guidelines for Ecological Impact Assessment. Version 7 July 2006;
- Scottish Natural Heritage's Handbook on Environmental Impact Assessment;
- 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 but 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 chapter differs 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 in general terms with further detail provided in Appendix 6.

The categories of site / nature conservation value and ecological function are as follows:

- International – sites, habitats and species of significance in a European context;
- National – sites, habitats and species of significance in the context of the UK;
- Regional - sites, habitats and species of significance in the context of the Scottish Borders;
- Local - sites, habitats and species of significance in the context of the area of Soutra and Oxton; and
- Negligible - negligible or no conservation value.

Criteria, including the Ratcliffe Criteria (Appendix 6) and the IEEM Guidelines have been considered while assessing the nature conservation value of the habitats and species/populations that the site supports. As there is rarely comprehensive quantitative data on the habitat or species population resource, particularly at the regional to local level, the nature conservation evaluation process necessarily also involves a qualitative component. This requires a suitably qualified and experienced ecologist to make a professional judgment based upon a combination of published sources, consultation responses and knowledge of both the site and wider area.

A second stage of evaluation entails a collective review of the differing levels of importance of the various habitats and species present, in order to reach an evaluation of the site as a whole. Ultimately, this evaluation is also a matter of professional judgment, guided by published sources, consultation responses and local knowledge.

The 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. For the purposes of this assessment, the characterisation of

the effects on specific receptors is described in the impact section, and then the magnitude of these combined effects is summarised as being one of the categories 'positive', 'neutral', 'minor negative', 'intermediate negative' or 'major negative', depending upon the extent of the area or population deemed likely to be affected by the development (Appendix 6, Table 2).

8.2.3.1 Significance of Impacts

The significance of an impact is a matter of professional judgment, but can be described in general terms as being a product of the ecological or nature conservation value of a site, and the magnitude of the predicted impact. 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.

Appendix 6, Table 3 shows a matrix which explains the relationship in general terms between the magnitude of impact and the nature conservation value / ecological function. 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. If such a departure is made in the text, the reasoning behind it will be explained.

Further details of the EclA methodology applied are contained within Appendix 6.

8.3 Baseline Conditions

8.3.1 Consultations

In ecological terms, the main issues raised by the consultees relate to the extension works required at the Annfield Bridge and any associated works within the watercourse; the construction of the bridge for the new side road; potential pollution of watercourses; habitat preservation and unhindered passage for migratory fish; potential impacts to otters and other European species; and mitigation for local badger and water vole populations.

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 is one statutory designated site within the preferred scheme extents and the details of this site are presented below:

River Tweed Special Area of Conservation / Site of Special Scientific Interest

The watercourses within the survey area (Leader Water, Headshaw Burn and Mountmill Burn) are included within the River Tweed Special Area of Conservation (SAC) as designated under the EC Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna.

SACs are areas of international nature conservation value whose designation is implemented into UK law through the Conservation (Natural Habitats & c.) Regulations 1994, and subsequent amendments ('Habitats Regulations'). These sites are referred to as part of the 'Natura 2000' network and an SAC is one of a number of international statutory designations that constitute a 'European site' under the terms of Regulation 10. SACs are designated in accordance with Regulation 7, to protect sites supporting examples of natural habitats in Annex 1 of the Directive and population of animal species in Annex 2 of the Directive (which excludes birds). Each SAC has published conservation objectives that relate to these features and under Regulation 48(1), it is against these objectives that potential implications of development proposals must be assessed by a competent authority before granting planning consent. This is referred to as *appropriate assessment* and differs from an EIA in terms of legislative requirements (covered by separate regulations as outlined above). An *appropriate assessment* is completed if a proposal or plan will have a likely significant effect on the site (but also if this is not known and the Precautionary Principle applies) and assesses whether there will be an adverse effect on the integrity of the site.

The Headshaw Burn and the Mountmill Burn are tributaries of the Leader Water and the confluence of these burns is located approximately 300m north of Oxtou, where the two burns meet to form the Leader Water. The River Tweed SAC is noted for its biological interest, including Atlantic salmon (*Salmo salar*), river lamprey (*Lampetra fluviatilis*), brook lamprey (*Lampetra planeri*), sea lamprey (*Petromyzon marinus*), European otter and as a watercourse characterised by *Ranunculion fluitantis* and *Callitricho – Batrachion* communities. In addition to its Natura 2000 status, the River Tweed is also cited as a Site of Special Scientific Interest (SSSI) for its biological interest under the 1949 National Parks and Access to the Countryside Act (designated in 1988 and then enlarged in 2001). The Leader Water which flows into the River Tweed approximately 19km south of Oxtou is designated as part of the River Tweed SSSI.

The Leader Water, Headshaw Burn and Mountmill Burn are all located close to the preferred scheme. The Headshaw Burn passes underneath the existing A68 immediately east of the D47/5 junction to Carfrae (Annfield Bridge) and also beneath the D47/5 to Carfrae. The Leader Water runs closest to the scheme extent between Netherhowden (to the east of where it passes under the C84 Oxtou) and approximately 20m to the east of the A68 between Riggsyde and the western edge of Oxtou (approximately 25m to the east of the A68). Mountmill Burn is located to the west of the new side road which links the C83 with the C84.

The nearest other designated sites are the Crichton Glen SSSI and Fala Moor SSSI, which lie several kilometres out with the study area.

Designated Woodland

SNH provided the locations of areas within the survey corridor that are included in the Inventory of Ancient Woodland sites. Ancient Woodland is not a formal designation as such, but in Scotland is a term applied to sites whose documented history shows them to have been continuously wooded since approximately 1750, and which are by extension considered likely to have been continuously wooded since the ending of the last Ice Age. Long-established woodlands are secondary woodland with a documented history extending back from 100 – 250 years. Ancient Woodland sites and their mature soils are considerably more complex and diverse ecosystems than secondarily wooded sites, and long-established woodland is biologically more complex than recent plantings. Ancient and long-established woodlands therefore represent an environmental asset that should be considered to be a finite resource, as it is not renewable in a human timescale.

There are no Ancient Woodlands within the survey area or the vicinity of the proposed scheme. However, an area of long-established plantation included in the SNH Inventory exists close to the disused quarries south of Kirktonhill, west of Airhouse (refer to Figure 8.1). This woodland is located along the southern bank of the Mountmill Burn, and is also part of Airhouse Wood SSSI. This SSSI is sufficiently far from the Scheme for there to be no direct or indirect impact upon it as a result of the proposed scheme. This site is therefore not considered further in this Chapter.

8.3.3 Habitats and Vegetation

Full details of the Phase I habitat types recorded within the study area are provided within Appendix 7. A brief summary of the dominant habitats and species is provided below with Figure 8.2 illustrating the Phase I habitat categories identified during the survey along with specific target notes recording particular features of interest. A description of these target notes is presented in Appendix 7, along with a flora species list.

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, though deciduous woodland does occur in one small area (south of Hillhouse, close to the edge of the D47/5). Agricultural land dominates the surrounding area, with a mixture of arable and improved grazing land. The River Tweed SAC has headwaters within the area, of which there are several burns of high quality in terms of both aquatic and riparian habitat.

In 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

Figure 8.2 shows that the majority of land adjacent to the A68 comprises intensive arable / improved grassland, and two areas of set-aside were present at the time of survey in 2005. Field margins are mainly modern post and wire fences or hedgerows comprising beech (*Fagus sylvatica*), hawthorn (*Crataegus monogyna*) and scattered mature trees. Most of the hedgerows are in poor condition, particularly the hawthorn hedge adjacent to the A68 between the D47/5 Carfrae Junction and the avenue of common lime trees (*Tilia x vulgaris*) at the southern end of the scheme. One section of dry stone wall was recorded within the agricultural land to the north of the scheme, on the western side of the D47/5 to Hillhouse.

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, their intrinsic nature conservation value is assessed as being negligible. In terms of 'linking' habitats, since there is no significant area of habitat linked together by 'wildlife corridors' running through the area (e.g. fragmented or segregated blocks of woodland only), this value is also considered to be negligible.

Woodland

Coniferous and mixed woodland occurs throughout the survey area although it comprises mainly segregated blocks or belts and is located away from the A68. As mentioned above, the woodland areas are fairly fragmented and on the whole, do not represent significant wooded links, though hedgerows do provide limited connection in some areas. On the northern side of the existing A68, a relatively large mixed woodland shelterbelt is present, showing some regeneration and ground flora cover. Mature deciduous woodland occurs east of the D47/5 to Hillhouse, dominated by ash (*Fraxinus excelsior*), elm (*Ulmus glabra*) and standing dead elm. An avenue of common lime trees is found at the southern end of the proposed scheme at Carfraemill Roundabout.

There is an area of rough ground at Henry's Wood (Target Note A4), by Headshaw Burn, adjacent to the A68, with an area of deciduous planting. The trees are approximately 11 years old with a mix of oaks (*Quercus* species), alder (*Alnus glutinosa*), rowan (*Sorbus aucuparia*), ash, holly (*Ilex aquifolium*), hawthorn, elm and sycamore. The ground layer is dominated by Yorkshire-fog, common nettle, a moss (*Rhytidiadelphus squarrosus*) and ribwort plantain (*Plantago lanceolata*), with abundant rosebay willowherb (*Chamerion angustifolium*), occasional gorse (*Ulex europaeus*), water avens (*Geum rivale*), cat's-ear (*Hypochoeris radicata*), creeping thistle (*Cirsium arvense*) and small amounts of common hogweed (*Heracleum sphondylium*) and colt'sfoot (*Tussilago farfara*).

These habitats are generally unremarkable in a local and national context and the Henry's Wood / broadleaved woodland areas are therefore assessed as local nature

conservation value. The plantation woodland is of negligible nature conservation value. However, most are closely associated with other, functionally complementary, semi-natural habitats, and may support protected or other species of conservation significance.

River Habitats

As mentioned above, the River Tweed SAC/SSSI supports important salmonid, lamprey, otter and plant populations / communities and includes the Leader Water, Mountmill Burn, Headshaw Burn and Kelphope Burn (Figure 8.2). The Leader Water is formed at the confluence of the Headshaw Burn and the Mountmill Burn and flows in a southerly direction through Lauderdale and the settlements of Lauder, Birkhill and Earlston before joining the River Tweed at Leaderfoot, 3 km east of Melrose, approximately 19 km from the extent of the scheme options. The Kelphope Burn feeds into the Leader Water by the existing A68 south east of Netherhowden, however this area will not be affected by the proposed route. The Headshaw Burn is a relatively fast flowing watercourse, of varying depth, averaging 2m in width, with gravel and silt dominated substrate, abundant riffles, pools and small rapids, and a waterfall. There is also a small burn running parallel to the D47/5, which feeds into the Headshaw Burn. The Mountmill Burn, which merges with the Headshaw Burn (Target Note A6), is approximately 1-2m wide and has a gravel bed with deep pools.

SEPA has advised that the Water Quality Classification of Mountmill Burn is Class A1 (excellent) and that of the Leader Water below the confluence of the Mountmill Burn is Class A2 (very good). The Leader Water upstream of the Mountmill Burn confluence is not classified but SEPA indicates that the water quality is likely to be A1/A2. SEPA have advised that, in terms of the Water Framework Directive criteria, given the high water quality and the remoteness of the watercourses from population centres, they are assumed to be of high / pristine status.

With regard to the botanical interest of the river habitats within the survey area, primrose (*Primula vulgaris*) was recorded by the Headshaw Burn, with water mint (*Mentha aquatica*), brooklime (*Veronica beccabunga*), butterbur (*Petasites hybridus*), lesser celandine (*Ranunculus ficaria*), broad-leaved dock (*Rumex obtusifolius*), rosebay willowherb, common nettle, colt'sfoot, garlic mustard (*Alliaria petiolata*), water avens, creeping soft grass, common dog violet (*Viola riviniana*), lady's mantle (*Alchemilla vulgaris*), spear thistle (*Cirsium vulgare*) and marsh marigold (*Caltha palustris*).

Rivers and streams are both a UK Biodiversity Action Plan (BAP) and Scottish Borders Local BAP priority habitat. The Scottish Borders BAP contains a Habitat Action Plan (HAP) for rivers and streams, which principally aims to maintain and enhance the ecology of river habitats. The River Tweed SAC system is included as one of the key sites. This HAP integrates with the Species Action Plan (SAP) for protected species that depend on river and stream habitats, most notably otter and water vole.

Due to the SAC designation covering watercourses in the study area, and because the

riverine habitats support a range of important animal populations, these ecological features of the site are evaluated as being of international nature conservation value.

Habitats Associated with Built Structures

There are several stone / concrete bridges (e.g. Annfield Bridge under the existing A68 and Headshaw Burn Bridge under the D47/5 Carfrae) and other man-made structures adjacent to or near the proposed works, which may offer potential habitat value e.g. bat roost sites. The dismantled railway located to the south west of the survey area provides a strip of semi-natural vegetation that links habitats in and around Oxton.

These man-made structures are collectively assessed as being of local nature conservation interest due to their limited potential to support bat roosts (section 8.3.5) and their relatively common and widespread occurrence in the area. Through completion of bat surveying, these structures are not currently known to support any roosting bats.

Borders Habitats of Conservation Concern

Policy N5 of the Scottish Borders Structure Plan 2001 – 2011 requests that a list of the Borders Habitats of Conservation Concern (BHoCC) is included within the EclA. Through consultation with the SBBRC, it has been confirmed that there are no BHoCC present within 500m of the preferred scheme.

8.3.4 Locally Important / Nationally Important Flora Species

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

Borders Species of Conservation Concern

Policy N5 of the Scottish Borders Structure Plan 2001 – 2011 requests that any Borders Species of Conservation Concern (BSoCC) are listed within the EclA. Through consultation with the SBBRC, it has been confirmed that three floral BSoCC have been recorded within 500m of the preferred scheme, namely juniper (*Juniperus communis*), greater-tussock sedge (*Carex paniculata*) and a lichen (*Bacidia incompta*).

Although not recorded during the Phase 1 habitat survey, juniper appears on SBBRC records (1999) for the Mountmill Burn. This species is included in the UK and Local BAP. Greater-tussock sedge was also recorded in 1999 close to Mountmill Burn and this species is listed within the Local BAP. *Bacidia incompta* was recorded at Oxton in 1979. This lichen is a UK priority species and listed on the red database as vulnerable.

Invasive Species

An extended Phase 1 habitat survey is not a comprehensive vegetation survey, although any observation of invasive plant species listed on Schedule 9 of the Wildlife

and Countryside Act 1981, as amended, are noted. No invasive plant species, such as giant hogweed (*Heracleum mantegazzianum*) or Japanese knotweed (*Fallopia japonica*), were recorded during the Phase 1 habitat survey, nor have any been previously recorded within the survey area by SBBRC. It is therefore considered at this time that invasive plant species are unlikely to be present.

8.3.5 Terrestrial Fauna

The preferred scheme lies within countryside containing habitat considered suitable for supporting populations of otter, bat species, badger, water vole, and red squirrel, amongst others. Baseline data and surveying have provided detailed information on the current presence of these species (Appendix 8) and Figure 8.3. A summary is provided below.

Otter⁶

There is an active otter holt upstream of Annfield bridge, within 30m of the proposed road widening. To date, it has not been identified as a breeding holt during surveying and its readily accessible location on the burn, its proximity to the main A68 / nearby farming activities and the presence of limited spraint sites in the vicinity would tend to indicate that it is not suitable for a breeding holt. Further evidence of otter presence, including active holts, were found on almost all watercourses within the study area and it is evident that otter are using all of the watercourses in the study area regularly (Appendix 8). Visual sightings of fish species during surveys suggest that potential prey is present and that otter are likely to make use of these abundant food sources. SBBRC have recorded a sighting of otter and spraints in February 2004, within the survey area.

This aspect of the study area's ecology is assessed as being of international nature conservation importance, as the otter population is one of primary reasons for the selection of the River Tweed as a SAC.

Bats⁷

The only records of bat species within the study area are common pipistrelle bats (*Pipistrellus pipistrellus*) at Carfrae Mill Hotel in 2002 (SNH bat roost records) and a

⁶ Otters are a European protected species due to their inclusion within Schedule 2 of The Conservation (Natural Habitats, & c.) Regulations 1994 (as amended). Certain activities may therefore require to be licensed if otters are present. The otter is also the subject of UK Species Action Plan (SAP).

⁷ All species of British bat are protected as European protected species due to inclusion on Schedule 2 of The Conservation (Natural Habitats, & c.) Regulations 1994 (as amended). This protection also covers their roosts and licenses are required for certain activities. Eight bat species are known to occur within Scotland, two of which (common pipistrelle *Pipistrellus pipistrellus* and brown long-eared *Plecotus auritus*) are listed within the Scottish Borders Local Biodiversity Action Plan.

single dropping recorded during surveying in 2005 on the roof of a shed adjacent to the existing A68. However, two stone bridges and several mature broadleaved trees within the study area were considered to have low-moderate potential to support roosting bats, although no evidence of current or recent use was recorded (Appendix 8). Suitable habitat exists in close proximity to these potential roost sites, with trees and woodland offering cover and foraging habitat.

As bats themselves are a European protected species and could potentially be present within the study area while foraging or while roosting within structures, this species is assessed as being of international nature conservation value. The structures themselves that may provide roosting opportunities to bats are limited and have been described above as of local nature conservation value.

Red Squirrel⁸

No sightings or signs of red squirrel were made in any of the woodlands surveyed and there are no known records of red squirrel activity within the scheme area itself. The nearest recorded red squirrel activity, as indicated in the red squirrel SAP of the Scottish Borders LBAP, is located approximately 8 km south of the study area. Red squirrels are therefore considered not to be present within the study area at this time, and furthermore, that they are unlikely to colonise the area in the short to medium term. For these reasons they are not given further consideration within this Chapter.

Water Vole⁹

No evidence of water vole was recorded during surveys, although suitable habitat is present along several of the watercourses. The water vole SAP in the Scottish Borders BAP indicates that the nearest record of this species in the region is several kilometres to the south of the survey area. SBBRC do however have one record of water vole activity within Headshaw Burn immediately downstream of the D47/5 Carfrae Bridge from February 2004 (droppings present on a rock). However, surveys in 2005 found no evidence of the presence of water voles. It is considered that this species is not present within the study area and as the streams that have historically shown evidence or that currently comprise suitable habitat will be unaffected by the road proposal, water vole are not considered further in the assessment.

⁸ Red squirrels are protected under the Wildlife and Countryside Act 1981 (as amended). Red squirrels are also a national and local BAP priority species.

⁹ In Scotland, water vole shelters / places of protection are protected through inclusion on Schedule 5 of the Wildlife and Countryside Act 1981, as amended. The water vole is also the subject of a UK Species Action Plan (SAP).

Badger¹⁰

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. 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 Transport Scotland. 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. No badger setts have been recorded within 30 metres of the proposed road improvement works although there are records of two badger road traffic deaths at Annfield Bridge.

Badgers are a common and widespread species across the Scottish Borders and the presence of badgers within the study area is assessed as being of national nature conservation value.

Borders Mammal Species of Conservation Concern

From consultation with the SBBRC, there are five BSoCC mammal species that have been recorded within 500m of the preferred scheme. These are common pipistrelle, water vole, badger, otter and brown hare (*Lepus europaeus*). All records are vague and place the mammals between Headshaw Burn and the Carfrae Junction. 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.

8.3.6 Birds

Through scoping and consultation, 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.

Specially protected species of wild bird¹¹ recorded within the study area include

¹⁰ Badgers (*Meles meles*) and their setts are protected by the Protection of Badgers Act 1992, by Schedule 6 of the Wildlife and Countryside Act 1981 (as amended) and by Schedule 6 of the Nature Conservation (Scotland) Act 2004.

¹¹ Species of bird, their nests and eggs benefit from a degree of 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".

brambling (*Fringilla montifringilla*), peregrine falcon (*Falco peregrinus*), barn owl (*Tyto alba*) and red kite (*Milvus milvus*) (data provided by SBRCC). No specially protected bird species were recorded during the course of other ecological surveys, although no specific surveys were completed.

The range of habitats means that a good range of bird species are present across the study area. Ornithological records from the SBBRC show that 68 bird species have been recorded within 500m of the preferred road scheme, including passerines and larger birds of prey. The bird fauna of the study area as a whole can be considered to represent a nature conservation resource of local value.

A total of 35 bird species are listed as BSoCC. A list of these species is included within Table 8.2.

Although there are no formal records, the RSPB advise that overwintering oystercatcher (*Haematopus ostralegus*) often occur within the streamside farmland around the D47/5 Carfrae road bridge over the Headshaw Burn, with approximately 60 birds recorded on one occasion in 2004. Dippers have also been observed nesting below and immediately adjacent to Annfield Bridge.

Table 8.2. Bird Species of Conservation Concern (BSoCC) in A68 Study Area.

Common Name	Latin Name	Common Name	Latin Name
Red kite	<i>Milvus milvus</i>	Swallow	<i>Hirundo rustica</i>
Sparrowhawk	<i>Accipiter nisus</i>	House martin	<i>Delichon urbica</i>
Kestrel	<i>Falco tinnunculus</i>	Grey wagtail	<i>Motacilla cinerea</i>
Peregrine	<i>Falco peregrinus</i>	Dunnock	<i>Prunella modularis</i>
Red-legged partridge	<i>Alectoris rufa</i>	Redstart	<i>Phoenicurus phoenicurus</i>
Grey partridge	<i>Perdix perdix</i>	Wheatear	<i>Oenanthe oenanthe</i>
Oystercatcher	<i>Haematopus ostralegus</i>	Song thrush	<i>Turdus philomelos</i>
Lapwing	<i>Vanellus vanellus</i>	Mistle thrush	<i>Turdus viscivorus</i>
Snipe	<i>Gallinago gallinago</i>	Willow warbler	<i>Phylloscopus trochilus</i>
Curlew	<i>Numenius arquata</i>	Goldcrest	<i>Regulus regulus</i>
Redshank	<i>Tringa totanus</i>	Spotted flycatcher	<i>Muscicapa striata</i>
Black-headed gull	<i>Larus ridibundus</i>	Starling	<i>Sturnus vulgaris</i>
Lesser black-backed gull	<i>Larus fuscus</i>	House sparrow	<i>Passer domesticus</i>
Cuckoo	<i>Cuculus canorus</i>	Tree sparrow	<i>Passer montanus</i>
Barn owl	<i>Tyto alba</i>	Linnet	<i>Carduelis cannabina</i>
Swift	<i>Apus apus</i>	Common redpoll	<i>Carduelis flammea</i>
Skylark	<i>Alauda arvensis</i>	Yellowhammer	<i>Emberiza citrinella</i>
Reed bunting	<i>Emberiza schoeniclus</i>		

8.3.7 Amphibians and Reptiles

No suitable habitat for great crested newt (*Triturus cristatus*) is present in the study area, due to a lack of ponds or marshy areas suitable for egg laying. A desk-based study reveals that there are no records of great crested newt in the general vicinity, the nearest records being approximately 26km west near Penicuik and approximately 28km south between Melrose and Hawick. No other amphibian species were recorded during surveys or provided by consultees.

No sightings, signs or records of slow worm (*Anguis fragilis*) or adder (*Vipera berus*) have been made, although adder are known to be widely distributed throughout the Borders and thought to be present in the vicinity of the study area. Reptiles are not considered to be an issue with respect to this scheme, they are not considered any further within the assessment.

8.3.8 Fish Species

The Tweed Foundation has confirmed through consultation that the Leader Water in the Oxtou area contains salmon and brown trout (*Salmo trutta*) and that it is likely to contain lamprey. This is reflected by the A1/A2 water classification and SAC designation. During Phase I habitat surveys, salmonid fry and parr were recorded. Both salmon and sea trout are listed locally as BSoCC.

Electric fishing surveys on Headshaw Burn (close to the D47/5 road bridge) have previously been completed by the Tweed Foundation during 1988, 2001 and 2003 (information provided by the SBBRC). These surveys confirmed the presence of salmon, brown/sea trout and eel (*Anguilla anguilla*) within this headwater.

As part of further survey work completed to inform the appropriate assessment process, a general fish habitat assessment survey was completed in December 2005 upstream and downstream of the Annfield Bridge located on the Headshaw Burn (Appendix 9). During this assessment survey salmon redds and salmon eggs were recorded along with dead adult salmon remains. In addition to this, the habitat assessment confirmed that there were suitable gravel beds and fast flowing water present, which provided suitable salmon and lamprey spawning and fry habitat. Areas of the Headshaw Burn and the Leader Water downstream of the Annfield Bridge also provide suitable fry and juvenile habitat for these species. A geomorphological survey (Appendix 10) was also completed to inform this ES and the appropriate assessment.

This aspect of the study area's ecology is assessed as being of international nature conservation importance, as the salmon population is one of the primary reasons for the selection of the River Tweed as a SAC.

8.3.9 Assessment of Nature Conservation Value

Table 8.3 summarises the nature conservation value allocated to the key habitats and species assessed as being of significance within the study area. It is against these

features of the site and surrounding areas that the assessment of impacts is made.

Table 8.3. Summary of Features of Nature Conservation Value.

Ecological Feature	Nature Conservation Value
River Tweed SAC / SSSI (Including Headshaw Burn, Mountmill Burn, Kelphope Burn, Hillhouse Burn and Leader Water)	International
Lowland agricultural land	Negligible
Plantation woodland (coniferous and mixed)	Negligible
Broad-leaved woodland / Henry's Wood	Local
Scattered trees	Negligible
Built structures (bridges, excluding dry stone walls)	Local
Hedgerows / Dry stone walls	Negligible
Bat/ Otter	International
Badger (and associated habitat)	National
Salmonids / lamprey (and associated habitat)	International
Ornithological Interest	Local
All other BSoCC Flora and Fauna (not listed individually above)	Regional

8.4 Assessment of Impacts

All potential long-term / permanent ecological impacts relating to the scheme are identified below. Although general, temporary impacts occurring during the construction period are considered under Disruption due to Construction (Chapter 15), ecological impacts arising during construction often have permanent implications post construction during scheme operation. For this reason such impacts are included in this Chapter.

8.4.1 Potential Impacts

The following potential long-term / permanent impacts have been identified:

- Changes to the ecological features of interest related to the River Tweed SAC/SSSI – This includes fish, plant communities, otters, water voles, their associated habitat requirements and other wildlife;
- Loss of vegetation and habitat resulting from land take requirements;
- Disturbance/damage to wildlife (e.g. birds, fish) and habitats from the demolition / construction and extension works to bridges and other built structures;
- Fragmentation and disturbance to protected mammal species and ornithological interests; and
- Changes to water quality of watercourses.

Impacts of a short-term / temporary nature have been assessed within Chapter 15 (Disruption due to Construction).

8.4.2 Characterisation and Significance of Impacts

Changes to the ecological features of interest related to the River Tweed SAC/SSSI

As mentioned within section 8.3.2, the preferred scheme crosses and runs directly adjacent to watercourses designated as part of the River Tweed SAC. These watercourses, the Headshaw Burn, Leader Water and Mountmill Burn all converge and flow eventually into the main stem of the River Tweed, therefore any changes to the riparian zones may have a direct impact upon fluvial geomorphology, otters, fish and aquatic plants while water quality changes will indirectly impact upon features further downstream.

Pollution can occur through the discharge of untreated run-off from the construction site, through for example soil stripping and excavations, which 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 temporary acute and permanent chronic adverse effects on juvenile salmon and trout and also on egg hatching success with silt smothering the gravel in which salmon and trout eggs grow and hatch. In addition, many silts may have a high organic content, increasing the oxygen demand and further compromising egg survival. Pollution may also have the effect of harming/destroying other aquatic life such as invertebrates, lampreys and floral species and terrestrial species feeding in these areas, such as otter.

In order to accommodate the widening of the A68 carriageway, the preferred scheme requires expansion of the existing Annfield Bridge which carries the existing A68 across the Headshaw Burn. Extension works will involve the placement of temporary sheet piling into the river bed directly upstream of the existing bridge, to allow extension of the existing abutments on each bank, spanning a length of approximately 8m (linear banking). The sheet piling will create a dry working area to allow the formation of new bridge abutments. This will result in a temporary physical disturbance to the banks and bed substrate of the Headshaw Burn through channel diversion works and restriction to the width and flow of the river channel at this point. This is addressed further in Chapter 15 (Disruption due to Construction). In this chapter the potential permanent impacts of the bridge extension are assessed in terms of fluvial geomorphology, flows and fisheries interests once construction has taken place and the scheme is operational.

A fluvial geomorphology survey was commissioned (from Dr David Gilvear, University of Stirling) in January 2006 in order to assess any impacts that the extension of Annfield Bridge may have. This report (Appendix 10) determined that there would be no geomorphological impact from the proposed bridge extension whether it is a 6m or

9m length of extension. Furthermore, once constructed the river would not be constricted or the flow conveyance limited. The 'natural' sediment dynamics would remain unaltered. In addition, the report concluded that the ecological status would not be affected either upstream or downstream of the works.

The design of the bridge (which includes no river or bankside obstruction) would result in fish passage being maintained for both salmon and lamprey and otter passage would not be compromised either (no obstruction to mammal passage). A fish habitat survey was also completed by Young Associates and the results (Appendix 9) confirmed that the study area is suitable for salmonid spawning and as juvenile nursery habitat, with salmon redds being recorded close to / underneath the Annfield Bridge. The habitat is also suitable for potential lamprey spawning and juvenile habitat (limited pockets of sand/silt beds). With an international value and intermediate negative magnitude, impact (siltation of gravels and redds and alteration to the river bed / channel) on fish interests is classified as **major adverse**. Discussions with SNH and SEPA have been on-going regarding the construction methodology and have also included a site visit. Shading of the river resulting from the extension of the bridge is not considered to have any impact upon the fisheries interests or upon otters as this would not affect the behaviour of these animals. As there will be no barriers or hindrance to otter movements resulting from the bridge structure (otters will be able to move along the banks) and working hours will be limited to daytime (not within 2 hours of sunrise or sunset, with no use of lights at the watercourses), the impact upon otter movement is considered to be of neutral magnitude and with a nature conservation value of international, the overall impact is classed as **neutral**.

During Phase I Habitat surveying / fish habitat and geomorphology surveys, which covered 500m either side of the proposed road option, *Ranuncion fluitantis* and *Callitricho – Batrachion* vegetation was not recorded as present within the watercourses. Although of international value, it is considered that, because this vegetation is absent from this tributary, there will be a neutral magnitude impact, resulting in an impact of **neutral** significance upon this particular SAC feature of interest.

A new bridge will also require construction for the new side road linking the C83 and C84. This bridge will cross the Headshaw Burn and run close to the Mountmill Burn. The bridge does not entail any in-river or bankside structures and the bridge abutments will be set back from the banks (a distance of 5m from each bank if possible in engineering terms). This structure will have no impact upon the ecological features of interest except for the potential for drainage to pollute, which is addressed within the 'changes to the water quality of watercourses' section below. Construction impacts are addressed within Chapter 15 (Disruption due to Construction).

Loss of vegetation and habitat resulting from land take requirements

In accordance with best practice, the scheme has passed through a number of design iterations over the course of the Stage 2 and Stage 3 DMRB assessments, during

which the loss of significant ecological features of the study area has been minimised. This has resulted in a scheme with land take adjacent to the existing road, involving small areas of habitat that are of negligible nature conservation value, comprising poor quality hedgerow and improved grassland. The collective loss of small areas of these undesignated, common and widespread habitats is an impact of minor negative magnitude and therefore considered to be of **neutral** significance.

Very small amounts (21m^2) of habitat will also be lost adjacent to the Headshaw Burn as part of the widening of Annfield Bridge (Appendix 10). In addition, small amounts of improved grassland (20m^2) will be lost as part of the new side road bridge construction. Although Headshaw Burn forms part of the River Tweed SAC, its adjacent habitats are not primary reasons for its selection as such e.g. no presence of vegetative features of interest (grazed and eroded agricultural land) and so, through professional judgment, the actual vegetation is given a nature conservation value of local although the burn is of high value with respect to its features of interest. Loss of small amounts of this habitat will not therefore directly affect nature conservation value and with a neutral magnitude, this overall impact is assessed as **neutral** and not significant.

Sections of hedgerow will be lost due to the widening of the road in several places. Although the hedgerows have been surveyed and are considered to be of negligible value due to their poor condition and 'gappy' appearance, they will be lost in some areas of the soft estate boundary resulting in an impact magnitude of minor and an overall impact significance of **neutral**.

Disturbance/damage to wildlife (e.g. birds, fish) and habitats from demolition / extension works to bridges and other built structures

No demolition works are required in relation to this scheme.

As mentioned above, the Annfield Bridge will require extending in order to accommodate widening of the A68 across the Headshaw Burn and this has been assessed. There are no existing culverts under the A68 within the scheme extents that may need to be extended or replaced. The new side road bridge has been assessed above and within Chapter 15 (Disruption due to Construction).

Otter passage during the construction of the Annfield bridge is also assessed in Chapter 15 (Disruption due to Construction) and above briefly. Fish passage has been discussed above.

Fragmentation and disturbance to protected mammal species and ornithological interests

The scheme is largely limited to on-line improvements within or immediately adjacent to the existing A68 highway boundary and there are no culverts / culvert extensions required so there will be no difference to the existing situation resulting in no additional fragmentation or barrier effects. As the baseline surveys and consultation exercise

confirm, apart from two recorded badger road traffic deaths at Annfield Bridge, there are no established mammal crossing points along the scheme extents. Other than the additional risk of wildlife mortality due to traffic collisions (covered below), there will be no impacts related to fragmentation.

Badgers, a feature of national nature conservation value, are and will remain at continued risk at regular crossing points such as at Carfraemill Roundabout (Badger Annex, Figure 1), which is close to but outside of the scheme limits. From the lack of evidence of routine badger movements across the A68 at Carfrae and the fact that the scheme involves on-line widening that will not cause badgers to significantly adjust their boundaries, the risk of increased road casualties due to faster traffic speeds may at worst be an impact of minor negative magnitude. This will result in a **slight adverse** but insignificant impact. At the Annfield Bridge, however, two badger road traffic accidents (RTAs) have been recorded (Badger Annex, Figure 1). Although no established badger crossing points have been found during surveying, it would appear that badgers (possibly from the Hillhouse area) occasionally attempt to cross the A68 at this location. As part of the scheme design, a pedestrian/cyclist/equestrian underpass will be provided at the location of the existing A68 and D47/5 junction and along with passing through underneath the bridge (as currently occurs), badgers will also be able to move through the underpass, if desired. This impact has been assessed as of intermediate negative magnitude resulting in a **major adverse** and significant impact.

No badger setts, as described in the confidential annex, will be directly affected by the proposed road scheme. 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 neutral magnitude and thus to represent a **neutral** and insignificant impact for the purposes of this EclA.

There have been no records of otter fatalities within the study area, and given the configuration of the river and road network, and availability of suitable otter habitat, road crossing points seem unlikely. Therefore, in the absence of mitigation, the risk of otter road casualties during the operational phase is not anticipated to differ from the existing situation. Therefore, for otters assessed as a feature of international value, the impacts of road widening on mortality are assessed as neutral magnitude, resulting in a **neutral** impact, which is considered of no significance in terms of this EclA. No holts will be lost, however one holt may potentially be affected by construction (Chapter 15 (Disruption due to Construction)).

A bat survey (using an endoscope and completed by a licensed bat worker) (Appendix 8) has indicated that the Annfield Bridge along with the D47/5 bridge further upstream are not suitable for roosting bats. There is a risk, however, that some trees that may require felling (e.g. trees identified within the Phase I Habitat Report at the southern end of the scheme) could potentially become occupied or used by roosting bats in the future resulting in harm or mortality of bats and therefore the magnitude impact of

disturbance to bats could potentially be major negative resulting in a **critical adverse** impact if bat mortality occurs.

At the northern end of the scheme, the proposed road widening passes very close to an area of the Headshaw Burn previously identified as having burrows that potentially belonged to water voles, although no evidence of water vole was found. Later surveys in 2005 confirmed that no signs of this species were present and birds (dipper) were observed to be using the holes for nesting. It is not possible to entirely rule out the possibility of water vole burrows being damaged/disturbed by the scheme at this location, but as water voles do not appear to be present and the holes appear to be a result of erosion/bird use, no impact is predicted (as with all transitory species, it may be possible for potential re-colonisation by the time the construction of the scheme begins which would require further consideration).

Widened carriageway, combined with increased speeds along sections of the road, may result in higher levels of wildlife casualties in the absence of mitigation. The impact of the scheme on the general fauna (non protected species) in the study area (regional value), over and above the existing risk to wildlife from the current road, is considered to be of neutral magnitude. This constitutes a **neutral** impact in terms of this EclA. As mentioned previously, there is no evidence or history of otter attempting to cross the road, however badgers may still occasionally attempt to cross at the Annfield Bridge even though a new underpass will be present. This impact is considered to have a magnitude of intermediate negative, resulting in a **major adverse** and significant impact.

Changes to the water quality of watercourses

SEPA has stated that under the terms of the Water Framework Directive (WFD) for a high quality watercourse it cannot allow deterioration and that the future objective 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 any engineering structures that may be required to cross the watercourse such as the new side road bridge, would have to be designed to protect the status of the watercourse as far as possible.

Currently the road drainage system comprises of 'kerbs and gullies' filtering into sealed drainage which then discharges into Headshaw Burn at the foot of Soutra Hill or into surrounding fields (Chapter 13 (Road Drainage and the Water Environment)).

As mentioned previously, the watercourses present within the study area, and some of the animal populations they support, are designated as part of the River Tweed SAC and are the most valuable nature conservation features likely to be affected by the A68 proposed improvement works. In the absence of mitigation, the bridge widening will cause disturbance to aquatic and riparian habitat along the stream corridor and adjacent bankside areas, in addition to downstream areas. Construction work is likely

to result in the release of sediment and/or otherwise polluted runoff into watercourses near to and/or downstream of working areas (addressed in Chapter 15 (Disruption due to Construction)).

The new side road linking the C83 and C84 requires a new bridge crossing of the Headshaw Burn. The road will also run in close proximity to the Mountmill Burn. The Headshaw Burn will not be impacted upon directly, since the construction of the new road and bridge does not involve any in-river engineering, however there will be a need to construct abutments on either side of the watercourse. The abutments will be set back from the bankside vegetation (by 5 metres if possible in terms of engineering) with the bridge structure spanning approximately 13m. Each abutment base will be approximately 2m in length. There will be a potential risk of temporary pollution to the Headshaw Burn resulting from the excavation of bridge piers which is addressed within Chapter 15 (Disruption due to Construction) along with a risk of permanent pollution to the Headshaw Burn / Mountmill Burn resulting from the drainage of the new side road. The drainage for the new side road will be discharged into a SUD system (currently proposed as a filtration reed bed allowing natural soakaway into the surrounding ground rather than outfalling to the watercourse). The road drainage will be carried to this facility via filter drains and wrapped drains. With a nature conservation value of international and a potential impact from road drainage of major negative, the overall impact significance could be **critical adverse**.

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).

The potential for impacts on these aquatic habitats and the species they support in the event of an accidental release of pollutants during construction cannot be entirely ruled out, although in the tightly regulated and well-managed operation of a major trunk road construction site, the risk of such an accident is likely to be low and will be covered by contingency plans included within the Environmental Management Plan (EMP).

As any such incident would be a result of an accidental release (with a low probability of occurring), it is not possible to be definitive about the nature, scale or duration of potential impacts. However, should such an incident occur the impact would be likely to be of major negative magnitude, affecting spawning and nursery habitat used by fish communities that contribute to the international value of the SAC, and therefore result in a **critical adverse** impact.

In the absence of mitigation, potential impacts on the water resources within the study area may result through the increased volume of surface water runoff into receiving waters, and from accidental spillage of contaminants, which may enter nearby

watercourses. This has the potential to release particulate matter, materials derived from rubber tyres and fuel, and other contaminants into the burns and cause disturbance to aquatic life, including migratory fish and aquatic invertebrates.

Increases in run-off and the containment of contaminants is controlled through managed road drainage, with attenuation and treatment of drainage forming an integral part of the scheme design (see Chapter 13, Road Drainage and the Water Environment). This improves upon the current drainage situation for the existing road and the magnitude of the effects of surface water drainage on water quality in the burns is assessed as of neutral magnitude and therefore assessed an overall **neutral** impact.

8.5 Mitigation

8.5.1 Significant Impacts

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

Impact upon the River Tweed SAC/SSSI – Fish

Detailed discussions have taken place with SNH and an agreed Construction Method Statement will be produced as part of the appropriate assessment process in order to minimise impacts on the SAC/SSSI and subsequently, on fish and other aquatic fauna. The Construction Method Statement will focus on in-river engineering requirements, particularly the extension works at Annfield Bridge / Headshaw Burn and will be agreed with SNH and SEPA in advance of the detailed design stage and the construction works. Measures to be incorporated will include the prevention of in-river works between the months of December and the end of June in order to protect the spawning gravels and fry and the provision of free passage to fish at all times. This mitigation is also likely to be a requirement within the in-river engineering licence that will be issued by SEPA as part of the Controlled Activities Regulations.

With the implementation of an agreed Construction Method Statement, adequate pollution prevention measures, appropriate methods and timing of construction works and under conditions of a licence granted under CAR, the residual impact will be reduced to minor negative magnitude with an overall impact of **slight adverse** and not significant.

Habitat Fragmentation / Disturbance to Badgers

Badgers will remain able to cross under the A68 at Annfield Bridge by passing under the bridge along the banks of the Headshaw Burn as is most likely to be the current situation. With the provision of a pedestrian / cyclist underpass at this location in place of the existing road junction, badgers will also be able to use this structure to pass under the A68. In order to promote the use of the bridge and the underpass, by both badger and otter, a length of combined (badger and otter) mammal fencing will be provided for a length of 100m either side of the bridge and the underpass, on each side

of the carriageway. This fencing will also be connected for the whole distance between the underpass and the bridge structure. The fencing will meet current approved standards and be erected in the appropriate manner. The design of the fencing will be in accordance with standard badger and otter combined fencing specification, in consultation with SNH, and specific design requirements and exact locations illustrated on engineering drawings included within the contract documents.

Within the Annfield Bridge and the extension, an otter / badger ledge will be incorporated onto the north bridge abutment at the side of the watercourse. The design and gradient leading to the ledge will follow current best guidance / DMRB Volume 10 and meet with SNH approval. A layer of Astroturf will also be provided on the surface of the ledge. This will assist with lamprey passage. These mitigation measures will be more beneficial to these species than current conditions.

The ledge and fencing at Annfield Bridge which are intended for use by mammals will be in place before the new road is opened.

In addition, a badger tunnel will be installed under the D47/5, just east of the new junction and subsequent bend. This tunnel will be flagged on either side with appropriate lengths of fencing.

By incorporating these additional mammal facilities at this bridge, side road and known badger RTA location, the residual impact will be reduced to neutral magnitude with an overall impact of **neutral** and insignificant.

In order to reduce the potential for felling of a tree supporting a bat roost or roosting bat, a pre-construction check of suitable trees and other suitable roost structures (previously identified in Appendix 8) will be completed by an experienced bat worker. Reasonable Avoidance Measures (RAMs) will be applied, where necessary, to ensure bats are able to exit and fly away (e.g. limb by limb felling of trees with limbs left exposed to allow safe bat emergence). Where possible, tree felling will be completed out with periods of cold winter temperatures when bats may potentially be hibernating and exposure to cold temperatures may result in bat mortality. If bats are found, a licensed bat worker will be employed to assess and deal with any situation arising and SNH will be notified. With the application of these measures, the residual impact will be reduced to minor negative magnitude with an overall impact of **slight adverse** and insignificant.

Badger Casualties

The mitigation measures identified above (combined badger and otter fencing) will also be effective in reducing badger RTA's. No further mitigation is considered necessary.

Water Quality – Accidental Spillage

The drainage design for this scheme will incorporate Sustainable Urban Drainage Systems (SUDS) comprising of filter drains, swales and detention ponds. These are

discussed further in Chapter 13 (Road Drainage and the Water Environment). These measures will allow any spillages to be contained within the detention ponds and swales to prevent spillages of fuel, oil and other contaminants from reaching the Headshaw Burn and subsequently, the Leader Water and River Tweed.

A Construction Method Statement will be implemented to ensure that the potential risks to receiving waters are minimised. This will include, for instance, measures to avoid / minimise potential for problems such as fuel and other chemical spills. A Pollution Incident Response Plan will be included as part of the EMP, to ensure that impacts from any potential accidental spill is reduced to a minimum.

For the new side road, the drainage will comprise of filter drainage along the edge of the road, which will aid filtration of any surface water prior to discharge at one specific area comprising of a reed bed which will provide secondary filtration prior to the water being absorbed into the surrounding ground. This will not only prevent pollution to the Mountmill Burn and Headshaw Burn, but it shall provide protection of the surrounding ground water resources.

The use of SUDS will assist in reducing the residual impact to minor negative magnitude and therefore an overall impact of **slight adverse**.

8.5.2 Application of Best Practice

In addition to identifying suitable mitigation measures for significant impacts, the best practice 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 (via inclusion with contract documents) 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, Road Drainage and the Water Environment, as well as above, and will

be further detailed as the design of the scheme progresses but will primarily comprise filter drains, swales and an attenuation pond located at the southern end of the scheme (Figures 13.1 – 13.5). The new side road will also comprise filter drains and reed bed filtration.

Monitoring Change

Although protected species are present along the road corridor and surveys to date have found otter holts and badger setts but not within areas to be lost or damaged, 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 these 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 (which do not currently seem to be present) 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. A watching brief/pre-construction check before the extension of Annfield Bridge will also be carried out. This requirement will be included within contract documents.

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 licenses obtained before works to disturb those species/habitat can be lawfully implemented by the Contractor.

On the basis of survey information gathered during 2004-2006, a European protected species development licence for otter will be required for work in the vicinity of the otter holt upstream of Annfield Bridge (located approximately 25 metres in distance from the existing A68 and approximately 15 metres from the proposed widening works). This licence will also be extended to cover works throughout the site as there is further 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 Statement is 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, as outlined within contract documents, to ensure that habitats or species of nature conservation value are not adversely affected. The site compound will be located away from the Headshaw Burn or any other watercourses within the scheme extents / flowing into the River Tweed SAC. Areas of ground disturbed by temporary offices / plant / hardstanding 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 Headshaw 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 Headshaw 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 pond that is being created as part of the drainage management system for the scheme (Chapter 13 (Road Drainage and the Water Environment)) represents a contribution toward the nature conservation resource of the local area, as this feature 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 pond in order to aid with filtration but the remainder of the pond will be left unplanted to allow a natural process of colonisation (this requirement will be included within contract documents, however the species and detailed design is a matter for discussion between consultees and the Contractor at the final design stage).

Planting within the soft estate boundary to include broadleaved 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 northwest-southeast woodland and hedgerow links. In addition, riparian species of tree such as willow will be planted along the banks of the Headshaw Burn within the vicinity of the Headshaw Burn in order to provide well-needed shade to fish species along with aiding the aquatic food source. 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.

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, subsoils 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 and the Nature Conservation (Scotland) Act 2004. It is necessary 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 Headshaw Burn where it is affected by bridge 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 South Soutra to Oxton Improvement Scheme, and the maximisation of any biodiversity benefits arising from implementation of the scheme. The overall residual impacts, after the implementation of the mitigation will result in no significant impacts.