



## Appendix A40.5 – Otter Report

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**Aberdeen Western Peripheral Route**  
Environmental Statement Appendices 2007  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

## **Contents**

<b>1</b>	<b>Introduction</b>	<b>1</b>
1.1	General Background	1
1.2	Background to Assessment	1
<b>2</b>	<b>Approach and Methods</b>	<b>3</b>
2.1	Consultation	3
2.2	Survey Methods	3
2.3	Evaluation of Nature Conservation Value	4
2.4	Impact Assessment	6
2.5	Limitations to Assessment	7
<b>3</b>	<b>Baseline</b>	<b>8</b>
3.1	Consultation Information	8
3.2	Survey Results	8
<b>4</b>	<b>Evaluation of Habitat Areas</b>	<b>19</b>
4.1	General	19
4.2	Evaluation Summary	22
<b>5</b>	<b>Potential Impacts</b>	<b>23</b>
5.1	Introduction	23
5.2	General	23
5.3	Summary	35
<b>6</b>	<b>Mitigation</b>	<b>35</b>
6.1	Introduction	35
6.2	General	36
6.3	Specific Mitigation	39
6.4	Summary	42
<b>7</b>	<b>Residual Impacts</b>	<b>43</b>
7.1	General	43
7.2	Specific Residual Impacts	44
7.3	Residual Impacts Summary	53
<b>8</b>	<b>References</b>	<b>54</b>

**Aberdeen Western Peripheral Route**  
Environmental Statement Appendices 2007  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

**Tables**

Table 1 – Evaluation of Ecological Receptor.....	5
Table 2 – Magnitude of Impact.....	7
Table 3 – Significance of Impact .....	7
Table 4 – Waterbodies and Habitat Features of Use to Otter in Section FL1 .....	11
Table 5 – Waterbodies and Habitat Features of Use to Otter in Section FL2.....	14
Table 6 – Waterbodies and Habitat Features of Use to Otter in Section FL3.....	17
Table 7 – Evaluation of Features for Otter in Section FL1 .....	20
Table 8 – Evaluation of Features for Otter in Section FL2 .....	20
Table 9 – Evaluation of Features for Otter in Section FL3 .....	22
Table 10 – Phase 1 Habitat Areas Pre and Post Construction .....	25
Table 11 – Table of Potential Impacts.....	31
Table 12 – Table of Specific Mitigation Measures.....	40
Table 13 – Watercourse Crossing Structures .....	42
Table 14 - Residual Impacts.....	45

## **1 Introduction**

### **1.1 General Background**

#### **Proposed Scheme**

- 1.1.1 This report is one of the appendices supporting Chapter 40 (Ecology and Nature Conservation) of the AWPR Environmental Statement (ES). It considers the potential impacts on otter populations associated with the Fastlink section of the proposed scheme. The results of the surveys carried out for the purpose of this assessment are also presented and are shown on Figures A40.7a-f.
- 1.1.2 The three component route sections in this report for the Fastlink study area of the proposed scheme are as follows:
- Section FL1: Stonehaven to Howieshill (ch0-3200);
  - Section FL2: Howieshill to Cookney (ch3200-6300); and
  - Section FL3: Cookney to Cleanhill Junction (ch6300-10200).
- 1.1.3 All tables and figures are structured in this manner.
- 1.1.4 The Ecological Impact Assessment (EclA) was undertaken in accordance with the Design Manual for Roads and Bridges (DMRB) Volume 10 and 11 (Highways Agency, 2001) and the Environmental Impact Assessment (Scotland) Regulations 1999, along with cognisance of draft Institute of Ecology and Environmental Management (IEEM) guidelines (IEEM, 2002).
- 1.1.5 These studies included desk-based consultation to collate existing information about otter populations in the study area for the proposed scheme and field surveys to provide current data about the status of otter populations and the habitats that support them.
- 1.1.6 Cumulative impacts are assessed in a separate report combining the predicted impacts for all habitats and species over the proposed route (refer to Part E: Cumulative Impact Assessment of the ES).

#### **Aims**

- 1.1.7 The purpose of the assessment was to:
- assess the presence and status of otter populations and their habitats in the study area;
  - assess the quality of riparian habitat present and evaluate the importance of the area for otter;
  - assess the potential impacts of the proposed scheme on the local otter population; and
  - identify appropriate mitigation measures.

### **1.2 Background to Assessment**

#### **Biology**

- 1.2.1 Otter are members of the Mustelidae family which also includes weasel, stoat, badger, polecat and mink. There are 13 species of otter worldwide although only the European otter (*Lutra lutra*) is native to Britain (Mason and Macdonald, 1986). The diet of otter varies but fish generally comprise over 80% with other prey including birds, amphibians, molluscs, crustaceans and small mammals. In the Dee and Don catchments in Aberdeenshire, otter diet consists of over 90% fish, mostly

**Aberdeen Western Peripheral Route**  
Environmental Statement Appendices 2007  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

salmonids (Kruuk et al., 1993). Otter generally favour riparian habitat although they may travel several miles over land to reach waterbodies or to cross between river catchments. In Britain, otter tend to be largely nocturnal where they occur in fresh water habitats (Kruuk, 1995; Environment Agency, 1999; Grogan et al., 2001) and diurnal in coastal areas (Kruuk, 1995).

- 1.2.2 Otter occupy a home range, which is a well-defined area where otter feed, rest and reproduce (Woodroffe, 2001). The size of an otter's range depends on the quality of the habitat and food supply (Kruuk, 1995). A typical home range may include a river, burns, ponds and adjacent woodlands and wetlands. Radio-tracking showed that in the Dee catchment, male home range sizes averaged 32km, but may be as long as 80km, with female ranges averaging 20km (Kruuk, 1995). Female and young otter foraged and spent most of their time in small burns and lochs while males were usually based on larger rivers such as the Dee, with frequent forays into the female areas (Kruuk, 1995). Otter mark their range by defecating (sprainting) in these areas. Otter spraint (faeces) is often found in conspicuous locations such as under bridges, on prominent rocks and overhanging tree roots or boughs (Mason and Macdonald, 1986; Environment Agency, 1999), and is generally located near important resources (Kruuk, 1995).
- 1.2.3 Home ranges may contain up to 30 resting sites and several sites may be used in an area with a plentiful food supply. These sites take a variety of forms including underground dens or 'holts', such as cavities in the roots of bankside trees, piles of logs, flood debris, drains, caves and holes in rock-falls. Otter holts sometimes have one entrance underwater and at least one entrance above the high water mark, but may be located well away from the water's edge. The more secure sites used for breeding are usually safe from disturbance and frequent flooding, and may be some distance from water with females taking care not to leave any signs of their presence. Instead of holts, otter may frequently use resting sites above ground in reed beds, tall herb vegetation and scrub. These above ground resting sites are often referred to as 'couches' (Environment Agency, 1999). Some individuals use mostly couches, even for breeding, and rarely use holts; on average along burns in Aberdeenshire, otter spend 58% of day-time resting periods in couches (Kruuk et al., 1998).
- 1.2.4 Typically, foraging activity occurs either nocturnally or at dawn or dusk. Male otter have been known to travel up to 30km overnight in search of food or potential mates, lying up during the day at any number of the resting sites (Woodroffe, 2001).

### **Status and Legal Protection**

- 1.2.5 The otter was once widespread throughout Britain. Between the 1950s and 1970s populations declined rapidly due to the pollution of watercourses, especially by organochlorines such as dieldrin (Jefferies, 1989). The decline now appears to have halted as a result of national and international legislation to protect otter as well as positive conservation management (Environment Agency 1999). However, the otter is still classified by the International Union for the Conservation of Nature (IUCN) as a 'vulnerable' species, and numbers of otter killed on UK roads are of serious concern (Philcox et al., 1999).
- 1.2.6 In the UK, otter are fully protected under the Wildlife and Countryside Act 1981 (as amended) through inclusion in Schedule 5. The Nature Conservation (Scotland) Act (2004) extends the protection of birds, animals and plants by revising Part 1 of the Wildlife and Countryside Act 1981 to include the term recklessly. Otter are also included in Schedule 2 of the Conservation (Natural Habitats, etc.) Regulations 1994 (Regulation 38). Under the above legislation, it is an offence to inter alia: intentionally and/or recklessly kill, injure or take otter; deliberately disturb otter; and/or intentionally or recklessly obstruct, damage or destroy otter holts or couches.
- 1.2.7 The otter is also listed on Appendix 1 of the Convention on International Trade of Endangered Species (CITES), Appendix II of the Bern Convention and Annexes II and IV of the EC Habitats Directive (92/43/EEC). The European sub-species is listed as 'globally threatened' on the IUCN/World Conservation Monitoring Centre Red Data List.

**Aberdeen Western Peripheral Route**  
Environmental Statement Appendices 2007  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

1.2.8

1.2.9 The otter has a UK Species Action Plan (UK SAP), the targets of which are:

- to maintain and expand existing otter populations; and
- by 2010 to restore breeding otter to all catchments and coastal areas where they have been recorded since 1960.

## **2 Approach and Methods**

### **2.1 Consultation**

2.1.1 The following were approached for their comments with regard to otter:

- Scottish Natural Heritage (SNH);
- Scottish Environment Protection Agency (SEPA);
- Dee District Salmon Fisheries Board;
- Scottish Wildlife Trust;
- North East Scotland Biodiversity Records Centre (NESBREC);
- Centre for Ecology and Hydrology; and
- Professor Hans Kruuk (otter specialist).

2.1.2 Consultation responses have been included in Section 3. The National Otter Survey of Scotland 1991 - 1994 (Green and Green) was also used as a reference.

### **2.2 Survey Methods**

#### **Field Survey**

2.2.1 The survey area was defined with regard to specified standards (DMRB Volume 10, 2001) and was agreed with SNH. The survey boundary extended 500m either side of the centreline of the proposed scheme alignment. Along major watercourses, it was extended up to 1km either side of the centreline of the proposed scheme. This was necessary to take into account alternative road and junction options, to confirm the status of the otter population using the feature and to confirm the presence of otter where signs were not recorded within the 500m study area. Otter surveys were undertaken between March and July 2006. As otter have no fixed breeding season, this period is considered to be optimal for identifying the features of importance to otter.

2.2.2 A single resurvey was undertaken along Back Burn and the Burn of Muchalls on November 10th 2006 to establish whether these habitats support breeding otters at this time and whether any of the lying up sites likely to be impacted were in use by (potentially breeding) otters based on the preliminary results obtained in early 2006. A single walkover survey was undertaken at Cowie Water in November 2006 to establish whether this watercourse is used by otter. The survey aimed to identify whether the burn and the otter population it supports may be a receptor to downstream impacts from the Fastlink, despite the fact that the burn lies outwith the 500m study area.

2.2.3 As otter avoid disturbance and are largely nocturnal, surveys usually have to be carried out by searching for otter field signs. In the present study, all watercourses and waterbodies including lochs, burns, rivers, field drains and ditches were surveyed for signs indicative of the presence of otter, including:

- otter spraint;

**Aberdeen Western Peripheral Route**  
Environmental Statement Appendices 2007  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

- footprints;
- actual, possible or potential resting sites. These include underground holts (e.g. beneath the roots of bankside trees) or above ground couches (e.g. in reedbeds);
- slides or other well-used access points to watercourses (though additional evidence would be required to positively confirm their use by otter);
- feeding remains e.g. fish carcasses (though additional evidence would be required to positively confirm these as evidence of otter presence); and/or
- sightings, including otter Road Traffic Accidents (RTAs) and evidence supplied by landowners and watercourse users.

2.2.4 In general, otter surveys only attempted to identify the terrestrial habitats of otter lying within 10m of a watercourse, although in some areas where otter signs were abundant, the survey was extended to include adjacent habitats and identify tracks leading from the watercourse. Incidental observations of tracks and signs were also made throughout the survey period.

2.2.5 In the present survey it was not necessary to undertake spot checks of any watercourses up to 5km from the watercourses (as recommended by the DMRB), as otter were present in all of the main watercourses surveyed and field drains frequently do not extend far beyond the survey boundary.

#### Habitat Evaluation

2.2.6 In addition to the otter surveys, data relating to the quality of identified water features was reviewed so that a general assessment could be made as to the suitability of the habitat for otter. This involved a review of the Freshwater Ecology Report (see Appendix 40.9) to obtain data on water quality classifications, riparian habitat and fish populations. The Average Score Per Taxon (ASPT score) referred to below relates to the SEPA river health category.

2.2.7 Factors that are likely to influence the survival of local otter are judged to be of the greatest importance when evaluating habitat value. As otter populations may be limited by prey abundance, areas possessing or allowing access to optimal foraging habitat are judged to be of key importance. Areas possessing sub-optimal foraging habitat, but have other habitat qualities (e.g. low levels of disturbance and dense riparian cover) are of lesser importance they are less likely to be vital to local otter survival (Kruuk et al., 1993). Details of how values of importance to the local otter population were derived are given below:

- very high value – a locally unique key resource, vital for maintenance of existing otter population.
- high value - optimal foraging habitat owing to locally abundant prey items coupled with low disturbance and suitable riparian habitat for cover and lying-up sites i.e. holts and couches.
- medium value - despite abundant prey items, location is considered sub-optimal due to either moderate disturbance levels or poor riparian habitat for cover and/or lying-up-sites.
- low value - location offers marginal food resources and/or poor habitat/cover and/or suffers from substantial disturbance.

## **2.3 Evaluation of Nature Conservation Value**

2.3.1 The value of the local otter population was determined by reference to any designations and the results of the consultations, literature review and field surveys. The criteria used were based on the Ratcliffe Criteria (Ratcliffe, 1977) used in the selection of biological Sites of Special Scientific Interest (SSSI). Sites and features were classified according to the criteria identified in Table 1, which is a general guide for all habitats and species.

**Aberdeen Western Peripheral Route**  
**Environmental Statement Appendices 2007**  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

**Table 1 – Evaluation of Ecological Receptor**

Ecological Importance	Attributes of Ecological Receptor
International (European)	<p><b>Habitats</b>            An internationally designated site or candidate site i.e. Special Protection Area (SPA), provisional SPA (pSPA), Special Areas of Conservation (SAC), candidate SAC (cSAC), Ramsar site, Biogenetic/Biosphere Reserve, World Heritage Site, or an area which meets the published selection criteria for designation. A viable area of a habitat type listed in Annex I of the Habitats Directive, or smaller areas of such habitat that are essential to maintain the viability of a larger whole. Any river classified as Excellent A1 and likely to support a substantial salmonid population. Any river with a Habitat Modification Score indicating that it is Pristine or Semi-Natural or Obviously Modified.</p> <p><b>Species</b>            Any regularly occurring population of an internationally important species, which is threatened or rare in the UK. i.e. a UK Red Data Book species or listed as occurring in 15 or fewer 10km squares in the UK (categories 1 and 2 in the UK BAP) or of uncertain conservation status or of global conservation concern in the UK BAP. A regularly occurring, nationally significant population/number of any internationally important species.</p>
National (Scottish)	<p><b>Habitats</b>            A nationally designated site i.e. Site of Special Scientific Interest (SSSI), Areas of Special Scientific Interest (ASSI), National Nature Reserve (NNR), Marine Nature Reserve, or a discrete area, which meets the published selection criteria for national designation (e.g. SSSI selection guidelines). A viable area of a priority habitat identified in the UK Biodiversity Action Plan (UK BAP), or of smaller areas of such habitat which are essential to maintain the viability of a larger whole. Any river classified as Excellent A1 and likely to support a substantial salmonid population. Any river with a Habitat Modification Score indicating that it is Pristine or Semi-Natural or Obviously Modified.</p> <p><b>Species</b>            A regularly occurring, regionally or county significant population/number of an internationally/nationally important species. Any regularly occurring population of a nationally important species which is threatened or rare in the region or county (see local BAP). A feature identified as of critical importance in the UK BAP.</p>
Regional (North East Scotland)	<p><b>Habitats</b>            Sites that exceed the county-level designations but fall short of SSSI selection criteria. Viable areas of key habitat identified in the Regional BAP or smaller areas of such habitat which are essential to maintain the viability of a larger whole. Viable areas of key habitat identified as being of regional value in the appropriate SNH Natural Heritage Future area profile. Any river classified as Excellent A1 or Good A2 and capable of supporting salmonid population. Any river with a Habitat Modification Score indicating that it is Significantly Modified or above.</p> <p><b>Species</b>            Any regularly occurring, locally significant population of a species listed as being nationally scarce which occurs in 16-100 10km squares in the UK or in a Regional BAP or relevant SNH Natural Heritage Future area on account of its regional rarity or localisation. A regularly occurring, locally significant population/number of a regionally important species. Sites maintaining populations of internationally/nationally important species that are not threatened or rare in the region or county.</p>
Authority Area (e.g. County or District) Aberdeenshire / City of Aberdeen	<p><b>Habitats</b>            Sites recognised by local authorities e.g. Sites of Interest for Nature Conservation (SINS) and District Wildlife Sites (DWS). County/District sites that the designating authority has determined meet the published ecological selection criteria for designation, including Local Nature Reserves (LNR). A viable area of habitat identified in County/District BAP or in the relevant SNH Natural Heritage Future area profile. A diverse and/or ecologically valuable hedgerow network. Semi-natural ancient woodland greater than 0.25ha. Any river classified as Good A2 or Fair B and likely to support coarse fishery. Any river with a Habitat Modification Score indicating that it is Significantly Modified or above.</p> <p><b>Species</b>            Any regularly occurring, locally significant population of a species which is listed in a County/District BAP on account of its regional rarity or localisation. A regularly occurring, locally significant population of a county/district important species. Sites supporting populations of internationally/nationally/regionally important species that are not threatened or rare in the region or county, and not integral to maintaining those populations. Sites/features that are scarce within the county/district or which appreciably enrich the county/ district habitat resource.</p>



**Aberdeen Western Peripheral Route**  
**Environmental Statement Appendices 2007**  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

Ecological Importance	Attributes of Ecological Receptor
Local (Intermediate local or village importance)	<p><b>Habitats</b>  Areas of habitat considered to appreciably enrich the habitat resource e.g. species-rich hedgerows, ponds etc. Sites that retain other elements of semi-natural vegetation that due to their size, quality or the wide distribution of such habitats within the local area are not considered for the above classifications. Semi-natural ancient woodland smaller than 0.25ha. Any river classified as Fair B or Poor C and unlikely to support coarse fishery. Rivers with a Habitat Modification Score indicating that it is Severely Modified or above.</p> <p><b>Species</b>  Populations/assemblages of species that appreciably enrich the biodiversity resource within the local context. Sites supporting populations of county/district important species that are not threatened or rare in the region or county, and are not integral to maintaining those populations.</p>
Less than Local (Limited ecological importance)	<p>Sites that retain habitats and/or species that are of limited ecological importance due to their size, species composition or other factors. Any river classified as Impoverished D and/or and with a Habitat Modification Score indicating that it is Severely Modified.</p>

**2.4 Impact Assessment**

2.4.1 In the assessment of significance of impact, consideration has been given both to the magnitude of impact and to the sensitivity of the receiving environment or species. The sensitivity of a feature was determined with reference to its level of importance although other elements have been taken into account, where appropriate. Methods of impact prediction used indirect measurements, correlations, expert opinion, and information from previous developments. Impacts include those that are predicted to be direct, indirect, temporary, permanent, cumulative, reversible or irreversible.

Impact Magnitude

2.4.2 The magnitude of an impact has been assessed for each element of the proposal. A definition of the magnitude impacts is presented in Table 2 and includes positive impact criteria in accordance with IEEM guidance (2002). The magnitude of each impact was assessed independently of its value or statutory status.

**Aberdeen Western Peripheral Route**  
**Environmental Statement Appendices 2007**  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

**Table 2 – Magnitude of Impact**

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

Impact Significance

2.4.3 The significance of an impact was determined according to the matrix of importance and magnitude as illustrated in Table 3.

**Table 3 – Significance of Impact**

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

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

**2.5 Limitations to Assessment**

2.5.1 Otter field signs can be found at any time of the year. However, due to the variable nature of wildlife and the limitations of survey methods, it is possible that not all field signs will have been recorded. Dense in-channel vegetation prevented access to some parts of water features which could have led to signs being missed.

### **3 Baseline**

#### **3.1 Consultation Information**

- 3.1.1 In response to otter population decline, a number of national population surveys were carried out in 1977-79, 1984-86 and 1991-94. In the final survey, 88% of sites surveyed in Scotland proved positive, representing a rise of 15% over the results from the first survey (Green and Green, 1997). Otter are now believed to be present in every river catchment in Scotland (Grogan et al., 2001). The fourth otter survey of Scotland is currently underway and is due for completion in 2006.
- 3.1.2 The National Otter Survey of Scotland 1991-94 (Green and Green, 1994) identified a significant increase in the number of sites showing positive signs of otter in the Grampian region with 91% of sites surveyed testing positive. The majority of negative sites were along isolated coastal fringes.
- 3.1.3 The National Biodiversity Network revealed records of the presence of otter in five of the six main 10km grid squares in the study area.
- 3.1.4 Most of the consultees possessed no records of otter in the Fastlink study area. However, the Kincardine Rural Community Council provided some records of otter sightings (included in section 3) and a number of landowners and local residents provided comments about the otter in the area.

#### **3.2 Survey Results**

- 3.2.1 There are a number of water features within 500m of the proposed scheme where no signs of otter were recorded. These were assessed as being of particularly low value to otter in terms of the habitat they provide and their suitability for otters. These water features have not been included in the baseline report or impact assessment, except where they form part of an integrated drainage network or part of the main drainage channel. The water features that fall into this category are:
- Cowie House Ditch;
  - Green Ditch;
  - Howieshill Burn;
  - Hillocks Burn;
  - Allochie Burn;
  - Cookney Ditch;
  - South, North and East Rothnick Burns;
  - Whiteside Burn;
  - Cairns Burn;
  - East Crossley Burn;
  - Cairnfield Burn;
  - Stranog Burn;
  - Greens of Crynoch Burn;
  - Wedderhill Burn;
  - Craigentath Ditch; and
  - Craigentath Burn.

**Aberdeen Western Peripheral Route**  
Environmental Statement Appendices 2007  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

- 3.2.2 Of the burns and water features recorded, nine water features were surveyed as part of the Freshwater Ecology assessment (see Appendix 40.9). Data from the freshwater ecology assessment pertaining to the quality of water and the availability of suitable prey items, have been included in Table 4, Table 5 and Table 6,.
- 3.2.3 Where it was considered that there may be potential for impacts on otter populations, e.g. major watercourses, the survey area was extended up to 1km either side of the proposed scheme. This approach was adopted to take into account alternative road and junction options or establish the status of otter in the area. The water features to which this applies are as follows:
- Limpet Burn;
  - Green Burn;
  - Burn of Muchalls;
  - Back Burn;
  - Burn of Blackbutts; and
  - Burn of Elsick.
- 3.2.4 Where signs were recorded outside the 500m area, these have been referred to and are indicated on Figures 40.7a-f. This includes the results of surveys that were undertaken under previous route option proposals for the AWPR, the data for which were collected by Jacobs surveyors in 2006 (refer to Chapter 3: Alternatives Considered).
- 3.2.5 Otter lying up sites and potential lying up sites are numbered from south to north across the Fastlink study area according to whether they are couches, potential couches, holts or potential holts. These are referred to hereafter in the report by their status and their letter (e.g. potential couch C2; couch C5; potential holt H2, holt H1). All lying up sites in the study area are shown on Figures 40.7a-f. Actual lying up sites are shown in red with their reference number and potential lying up sites shown in black with their reference number.
- 3.2.6 Average Score Per Taxon (ASPT) data obtained from a review of the water quality data detailed in the Freshwater Ecology Report (Appendix 40.9) is also summarised in Table 4, Table 5 and Table 6 below. The report also identified Back Burn, Burn of Muchalls and Crossley Burn suitable for assessment for fish.

**Section FL1**

- 3.2.7 There are six waterbodies within Section FL1, of which Megray Burn, Limpet Burn, Coneyhatch Burn, Green Burn and Fishermyre Pond (locally known as Allochie Lochan) are assessed in Table 4 and Figures 40.7a–b.
- 3.2.8 Otter activity was recorded along the four main watercourses and is centred on Limpet Burn where the most signs and a potential couch (C1 – outside the study area) were recorded. Otter activity on Megray Burn is evident from spraints and a print, indicating that otter move along the burn as far as the A90. On Limpet Burn, a number of feeding remains and spraints of all ages indicate regular movement of otter up and down the burn. It is likely that the same group of otter using Limpet Burn also explore Megray Burn and Coneyhatch Burn. There is good connectivity between these burns that also share suitable lying up habitat in Megray Wood and upstream sections of Limpet Burn.

**Aberdeen Western Peripheral Route**  
Environmental Statement Appendices 2007  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

- 3.2.9 Green Burn was marked with old spraint indicating regular use by otter. Green Burn and Coneyhatch Burn have their source in a large heathland, bog and scrub area ideal for breeding otter and offering seasonal foraging opportunities. An overland otter track crossing marshy grassland and the B979 road was identified leading towards Coneyhatch and Green Burns from Fisheryre Pond. Spraints were recorded at the pond which may act as a hunting ground for otter commuting between watercourses in the study area and the Burn of Monboys in the west. The watercourses in this section have variable water quality from Poor (Green Burn) to Excellent (Back Burn) (see Appendix 40.9: Freshwater Ecology).

**Aberdeen Western Peripheral Route**  
**Environmental Statement Appendices 2007**  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

**Table 4 – Waterbodies and Habitat Features of Use to Otter in Section FL1**

Water Feature	Grid Ref	Disturbance	Cover	Water Quality	Otter Present/Absent	Holt/Couch	Observations
Megray Burn	NO 874 876	LOW - MEDIUM Surrounded by arable farmland; busy A90 and B979 roundabout within 20m of burn and burn passes under railway.	Limited to 2m either side of the burn – grassy overhangs and occasional gorse scrub, some alder, bramble and small conifer plantation. Mostly open arable farmland.	ASPT score suggests water quality is good.	PRESENT	None evident	Burn 1-2m wide, fast flowing in places. There is a small pond within sitka spruce plantation. Three old otter spraints were found on rocks near the pond and an adult footprint under a farm access bridge. Potential lying up opportunities exist in rabbit burrows immediately adjacent to channel although these showed no signs of being used by otter. Limpet Burn and the Burn of Glithno are a short commuting distance away and Megray Burn flows in to Cowie Water, which supports a population of otters and is likely to be a key resource.
Limpet Burn	NO 875 888	LOW - MEDIUM Medium disturbance from fishermen, maintenance works, A90 road and railway and arable farming in the east; low levels upstream in wide river valley. Minor 'B' road runs alongside burn.	Wetland, scrub and shrubs extensive along the burn; good cover suitable for breeding exists upstream in gorse and bracken scrub, mixed and broadleaved wet woodland and Megray Wood.	Fish ponds stocked with rainbow/brown and blue trout. ASPT score is low in modified downstream reaches.	PRESENT	Potential couch recorded at: NO 883 889 (C1)	Burn flows into the sea within 500m of survey boundary, but access to the coast is limited by a 20m waterfall. Burn 1m wide through Megray Wood and wider downstream near the fishponds where wet marshy ground exists. Ponds and burn downstream of ponds heavily managed and canalised. One old spraint was found near the upstream end of burn and on a stone in Megray Wood, and many fresh and old spraints and fish remains around ponds and inside culvert under A90. A potential couch was recorded in a smooth hollow under a tree marked with a spraint. No signs found in overgrown Limpet Drain. Megray Burn, Coneyhatch Burn and the Burn of Glithno are a short commuting distance away. A local landowner has seen otter along the burn in recent years.

**Aberdeen Western Peripheral Route**  
**Environmental Statement Appendices 2007**  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

Water Feature	Grid Ref	Disturbance	Cover	Water Quality	Otter Present/Absent	Holt/Couch	Observations
Coneyhatch Burn	NO 870 899	LOW – MEDIUM Low disturbance in Megray Wood; moderate disturbance from human activity around farmland and Coneyhatch Farm	Potential lying up cover in grass within Megray Wood and in scrub woodland and heathland north of Coneyhatch Wood; some areas open with little cover away from channel. The burn links with an extensive area of heathland and bog with gorse, heather ( <i>Culluna vullgaris</i> ) and reeds ( <i>Juncus</i> spp). ideal for breeding otter.	n/a	None evident	None evident	Coneyhatch Burn is narrow (around 1m wide) with slow flow or stagnant water in places and canalised through Megray Wood and adjacent to Coneyhatch Farm. The burn is a tributary of Limpet Burn, an area of otter activity. No evidence of otter using the burn was found but otter are known to explore along adjacent Limpet Burn and nearby Green Burn. Cover and excellent lying up opportunities exist in Megray Wood nearby and in scrub north of the Farm.
Green Burn	NO 869 903	LOW – MEDIUM Dogs at Cantlayhills Farm; burncrossed by class C road	Moderate cover from gorse along burn and surrounding pasture farmland. Upstream reaches flow through extensive area of heathland and bog with gorse, <i>Culluna</i> sp. and <i>Juncus</i> spp. Ideal for breeding otter.	ASPT score suggests that water quality is poor despite semi-natural nature.	PRESENT	None evident	Small burn 1m wide with steep gradient and straightened drainage ditches at top end. Much of the burn overgrown with gorse. Howieshill and Hillocks Burns join Green Burn near confluence with Burn of Muchalls. Coneyhatch Burn is a short commuting distance to the west. Spraint was found near Coneyhatch Burn and at the confluence of Green Burn with Burn of Muchalls which is extensively used by otter; Potential lying up exists under gorse.
Fishermyre Pond	NO 861 903	LOW - MEDIUM The pond is surrounded by pasture and semi-improved farmland. Pond used for fishing. B979 road runs within 50m of the pond.	Moderate cover around the westernmost banks of the pond from heather, reeds and scrub providing shelter and temporary resting opportunities.	Stocked with trout; signs of water vole.	PRESENT	None evident	Large pond stocked with fish which provide a reliable source of prey. Many spraints and feeding remains were recorded around the pond which also provides a suitable seasonal prey resource. An overland track leads from the pond toward the B979 where a hole in the fence is marked by spraint; the pond is within commuting distance of Coneyhatch and Green Burns.

**Aberdeen Western Peripheral Route**  
Environmental Statement Appendices 2007  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

**Section FL2**

- 3.2.10 Only two of the named watercourses in this section have been assessed, Back Burn and the Burn of Muchalls (refer to paragraph 3.2.1). Green Burn and its tributaries have been assessed as part of Section FL1. The results of Section FL2 are illustrated in Table 5 and Figure 40.7c.
- 3.2.11 High levels of otter activity were recorded on both Back Burn and the Burn of Muchalls including lying up sites and spraints. Adult prints were recorded along both burns and prints belonging to a juvenile were recorded adjacent to the Burn of Muchalls outside the survey area suggesting that the burn is used by breeding otters. Suitable undisturbed lying up habitat exists in the scrub and heathland south of Back Burn. Two couches and five potential couches were identified adjacent to both burns (couches C1 and C2 outwith the study area; potential couches C2– C6).
- 3.2.12 The ponds on the Burn of Muchalls provide a reliable source of fish prey and sightings by local residents also confirm the presence of otter. As Back Burn is a tributary of the Burn of Muchalls, it is possible that the same group of otter use both burns. Repeat surveys in November 2006 revealed further signs of otters including adult prints, spraint and signs of use at a holt in a drainpipe outside the study area. Disturbance immediately adjacent to the confluence of Back Burn was observed where another large man-made pond was being constructed. Otter territories may extend along both burns including across the B979 to Allochie Burn and Muchall Ditches, although no signs were recorded in these ditches. The water in both Back Burn and the Burn of Muchalls has been assessed as being of Good quality (see Appendix 40.9)



**Aberdeen Western Peripheral Route**  
**Environmental Statement Appendices 2007**  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

**Table 5 – Waterbodies and Habitat Features of Use to Otter in Section FL2**

Water Feature	Grid Ref	Disturbance	Cover	Water Quality	Otter Present/Absent	Holt/Couch	Observations
Back Burn	NO 871 919	LOW – MEDIUM Most of the burn surrounded by arable and pasture farmland; Medium disturbance around farm buildings and gardens from people and dogs; crossed by B979.	Mostly open improved/semi improved grassland and tilled farmland with grasses, occasional gorse scrub provides limited shelter. Large area of bog, heath and scrub surround Allochie Burn to the south of Back Burn.	Fish and macrophytes present; ASPT score suggests water quality is excellent. Salmonids unlikely to be present, trout may be present.	PRESENT	Couch recorded at NO 857 918 (C1) Potential couch recorded at NO 866 913 (C2) NO 871 917 (C3)	Tributary of the Burn of Muchalls; narrow burn 0.5m wide with straightened ditches at the top end and with grazing adjacent to the burn. Extensive signs of otter along the burn both sides of B979 including spraints and a print 65mm wide (adult). A couch was recorded under a bridge with dry straw bedding outwith the study area (Couch C1). Potential lying up opportunities exist in gorse scrub either side of Back Burn in places and potential couches were noted in shallow cavities between boulders (C3) and under a farm access bridge over the burn (C2). A local resident reported that an otter came out from under the shed west of the B979 road in March 2006.
Burn of Muchalls	NO 873 919	LOW – MEDIUM Low disturbance along most of the burn from sheep and people; medium disturbance around by ponds from anglers and at downstream end.	Dense to moderate scrub cover along the burn including gorse, broom, fir and tall herb vegetation, also boulders and mixed/broadleaved trees adjacent to burn in some places; improved/semi improved grassland also exists.	ASPT score suggests water quality is good. Salmon unlikely to be present; trout present.	PRESENT	Couch recorded at NO 867 922 (C2) Potential couch recorded at NO 8740918 (C4) NO 869 920 (C5) NO 868 922 (C6)	Burn 1 – 3m wide and fast flowing with well developed floodplain in lower reaches. Good lying up potential and cover all along the burn, including at confluence of Green Burn which drains Red Moss of Netherley and flows to the North Sea at Bridge of Muchalls. Fish ponds adjacent to the burn in upstream reaches. Many signs of otter present along the length of the burn during both surveys including potential feeding remains, runs marked with recent and older spraint, prints and flattened grass and earth. A sign heap and adult prints were identified near Burnorrachie Farm A juvenile otter print was identified near Pityot Farm indicating that otters may breed along the burn. One couch was recorded in flattened grass near a pond, marked by spraint and a run (couch C2). A potential couch was recorded under a rock between the ponds and burn with spraint and a print nearby (potential couch C6). Another potential couch was recorded marked with prints and spraint under a rock (potential couch C5) and a couch was recorded in an old beech tree

**Aberdeen Western Peripheral Route**  
 Environmental Statement Appendices 2007  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

Water Feature	Grid Ref	Disturbance	Cover	Water Quality	Otter Present/Absent	Holt/Couch	Observations
							<p>bole and overhanging tree roots (potential couch C4). Further potential for lying up was noted in gorse and gaps between boulders all along the burn. The nearest holt was recorded over 100m outside the study area.</p> <p>During the consultation process, Kincardine Rural Community Council has noted the presence of otter in this burn.</p>

**Aberdeen Western Peripheral Route**  
Environmental Statement Appendices 2007  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

**Section FL3**

- 3.2.13 Of the water features in this section, five main watercourses have been assessed: Burn of Blackbutts, Balnagubs Burn, the Burn of Elsick, Crossley Burn, and Crossley Pond (refer to paragraph 3.2.1). Field drains are included in the assessment for the Burn of Elsick and Crossley Burn. The results are shown in Table 6 and Figures 40.7c–f.
- 3.2.14 The Burn of Blackbutts is closely connected to the Burn of Muchalls, which is a key area of otter activity. Although prints, spraints and a potential holt (H1) were located outwith the study area, it is likely that otter will explore further upstream and it is possible that overland tracks may link the Burn of Blackbutts with foraging opportunities in the Burn of Muchalls at Elrick, especially given the presence of shelter suitable for lying up.
- 3.2.15 The Burn of Elsick and associated drainage channel network including Balnagubs Burn, North and East Rothnick Burns, Whiteside Burn and Crossley Burn were identified as being a centre of otter activity. Abundant signs including spraints, sign heaps, adult otter prints and couches (couches C3-C5; potential couches C7-C10) were found along the main burn and surrounding tributary burns including Balnagubs Burn, North Rothnick Burn and Crossley Burn. The sheltered nature of the channels and adjacent areas of undisturbed scrub are considered ideal for lying up and it is likely that the same group of otter may explore along the other channels in the vicinity, using overland tracks when the in-channel vegetation is too high.
- 3.2.16 Crossley Burn, in combination with Cairns Burn and Whiteside Burn, is likely to provide a commuting route between Crossley Pond and the Burn of Elsick and resources in the east. It is likely that the otter observed nearby used Crossley Burn and the Burn of Elsick, although no signs of otter were recorded during surveys. An old spraint on the banks of Crossley Pond indicates its use by otter and may be accessed from the Burn of Elsick network as observed by a local resident, or via drainage channels from Crynoch Burn.
- 3.2.17 The Burn of Elsick and Whiteside Burn have been assessed as being of Good quality and Crossley Burn has been assessed as being of Fair quality (see Appendix 40.9).

**Aberdeen Western Peripheral Route**  
**Environmental Statement Appendices 2007**  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

**Table 6 – Waterbodies and Habitat Features of Use to Otter in Section FL3**

Water Feature	Grid Ref	Disturbance	Cover	Water Quality	Otter Present/Absent	Holt/Couch	Observations
Burn of Blackbutts	NO 874 926	LOW Minimal disturbance from arable/pasture farming and quiet roads.	Cover limited to 5m either side of burn; dense gorse and shrub scrub in lower reaches and small scrub and marshy grassland area upstream.	n/a	PRESENT	Potential holt recorded at: NO 880 922 (H1)	Narrow (<1m), slow-flowing burn running through farmland with narrow undisturbed channel with patches of dense gorse scrub and small marsh, ponds and scrub areas offering potential for lying up and foraging. The burn is an upstream tributary of the Burn of Muchalls. Otter prints recorded in channel and spraints identified under culverts.
Balnagubs Burn	NO 873 947	LOW Burn has steep sides and surrounded by arable and pasture farmland. Poached by cattle in some small areas.	Moderate cover from high banks and herbaceous vegetation, gorse scrub and shrubs. Occasional piles of boulders and overhanging banks also provide cover and potential lying up habitat within and close to the channel.	n/a	PRESENT	None recorded	Balnagubs Burn is up to 1.5m wide and flows into the Burn of Elsick, forming part of a large network of field drains where active couches and further signs of otter have been identified.  Fresh spraint was recorded on a rock and it is likely that otter use the banks of the channel during the summer when the burn is choked with vegetation.
Burn of Elsick	NO 873 951	LOW Burn has steep sides and surrounded by arable and pasture farmland. Burn crossed by one minor road.	Moderate cover from high banks and herbaceous vegetation, gorse scrub and shrubs. Occasional immature trees; piles of boulders and overhanging banks also provide cover within and close to the channel.	ASPT score suggests that water quality is Good; small fish observed in water; signs of nesting birds and voles.	PRESENT	Couch recorded at: NO 879 950 (C3) NO 879950 (C4) NO 880949 (C5) Potential couch recorded at: NO 880950 (C7) NO 878950 (C8) NO 881953 (C9)	The Burn of Elsick is up to 2m wide and flows into the sea at Newtonhill Bay giving connectivity with coastal resources. Stoneyhill Burn, Balnagubs Burn, South Rothnick Burn, North Rothnick Burn and East Rothnick Burn, Whiteside Burn, Crossley Burn, Cairns Burn, Cairnfield Burn and East Crossley Burn form a network of interconnected channels in the study area.  Abundant signs of otter including sign heaps and prints belonging to an adult otter recorded all along the burn and its tributaries including inside culverts and along Balnagubs Burn. Couches including fresh bedding material recorded under a small access bridge and under gorse bushes along the channel.

**Aberdeen Western Peripheral Route**  
**Environmental Statement Appendices 2007**  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

Water Feature	Grid Ref	Disturbance	Cover	Water Quality	Otter Present/Absent	Holt/Couch	Observations
Crossley Burn	NO 871 963	LOW – MEDIUM Shallow sided burn poached by cattle in a number of places, surrounded by pasture.	Low cover – relatively open with some scrub and shrubs and a small strip of conifers providing limited cover.	ASPT score suggests the water quality is fair; salmon unlikely but trout possible.	None evident	Potential couch recorded at: NO 871964 (C10)	Crossley Burn, Whitestone Burn and Cairns Burn form part of the field drain network draining into the Burn of Elsick. The burn is narrow (1m). No signs of otter present however, the burn network represents a probable commuting route between the Burn of Elsick and features in the west including Crossley Pond and Crynoch Burn. Potential lying up site recorded under gorse bushes alongside Cairns Burn.
Crossley Pond	NO 865 963	MEDIUM Pond surrounded by arable farmland and managed by Angling Association for recreational fishing.	Cover within the immediate vicinity of the pond limited to some scrub and grassland; No shelter in farmland around the outside.	Pond is stocked with trout.	PRESENT	None evident	Small man-made quarry pond with limited cover and used by fishermen, but stocked with a reliable source of fish prey. A single old spraint was recorded on a fishing stage indicating that otter occasionally use the pond. The pond is isolated from other watercourses but may be reached by otter with main territories on Crynoch Burn or the Burn of Elsick, via the network of field drains and terrestrial features including dry stone walls. A local resident observed an otter crossing fields toward the pond in 2002.

## **4 Evaluation of Habitat Areas**

### **4.1 General**

4.1.1 Each watercourse identified in Section 3.2 has been evaluated in terms of its value and importance to otter on the basis of interpretation of field signs, following the criteria outlined in Table 1.

4.1.2 Smaller drainage ditches, ponds and water features that are not described individually are considered in isolation to be of low value and less than local importance to otter. This is due to their size, the quality of the resource they provide, the high levels of disturbance to which they are subjected and/or the absence of signs of otter.

#### **Section FL1**

4.1.3 The evaluation of watercourses for their importance for otter in Section FL1 is summarised in Table 7. The cover provided along Megray Burn includes occasional scrub, trees and overhanging banks with rabbit holes. Cover is largely limited to the narrow channel that is situated in otherwise unsheltered arable farmland along most of its length and suffers from some disturbance from the A90. However, the burn is strategically located between Limpet Burn to the east and the Burn of Glithno to the west, and high cover in Megray Wood provides lying up opportunities. Otter are thought to use the channel infrequently. Megray Burn is therefore considered to be of medium value and county importance to otter.

4.1.4 The ponds at Limpet Burn provide a stable supply of fish and other prey items. However, disturbance levels from the A90 and recreational fishing activities are relatively high in the downstream section. The upstream section, including Megray Wood, provides abundant lying up opportunities suitable for breeding with a potential couch recorded near the ponds. Otter are known to use the burn extensively and may travel between Limpet Burn, Megray Burn and Glithno Burn and along field drains to the north of Megray Wood. The habitats and resource at Limpet Burn is therefore considered to be of high value and the otter population of regional importance.

4.1.5 Good cover in the form of conifer plantation woodland, immature scrub woodland, grassland and bog along Coneyhatch Burn provides a secluded commuting route between the regionally important population resident in Limpet Burn. Good foraging resources are available in Fishermyme Pond and the Burn of Muchalls via Green Burn. Although no signs were recorded, this burn is considered likely to support otter. The strategic value of the burn and its suitability for lying up and potentially breeding makes the burn of medium value and county importance.

4.1.6 Despite moderate cover provided by adjacent gorse scrub and proximity to the Burn of Muchalls (an important centre of otter activity), few signs of otter were recorded along Green Burn and adjacent Howieshill and Hillocks Burns, with two sightings recorded. Despite this, the burn is likely to be used occasionally by foraging otter who may also investigate the burns and ditches for lying up opportunities, commuting along the burn toward Coneyhatch Burn and Fishermyme Pond. Green Burn and bog area is therefore considered to be of medium value supporting an otter population of county importance.

4.1.7 Fishermyme Pond provides a reliable source of fish prey as well as an excellent seasonal foraging resource which signs indicate that otter exploit regularly. Temporary lying up opportunities exist in the scrub and heathland adjacent to the pond, to which otter may commute from Coneyhatch and Green Burns in the east. The pond is considered to provide medium value habitat and support a population of otter of county importance.

**Aberdeen Western Peripheral Route**  
**Environmental Statement Appendices 2007**  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

**Table 7 – Evaluation of Features for Otter in Section FL1**

Water Feature	Habitat Value	Use by Otter	Evaluation	Reason for Valuation
Megray Burn	Medium	Foraging, commuting, potential lying up.	County	Megray Burn supports a population of an internationally important species not threatened or rare in the region, and the burn is not integral to maintaining this population.
Limpet Burn	High	Foraging, commuting, potential lying up.	Regional	Limpet Burn maintains a population of this internationally important species which is not threatened or rare in the region; due to the quality of habitat and the presence of reliable food source.
Green Burn	Medium	Commuting, potential lying up.	County	Green Burn supports a population of an internationally important species not threatened or rare in the region, and the burn is not integral to maintaining this population.
Coneyhatch Burn	Medium	Commuting, potential lying up.	County	Coneyhatch Burn likely to support a population of an internationally important species not threatened or rare in the region, and the burn is not integral to maintaining this population.
Fishermyre Pond	Medium	Foraging, potential lying up.	County	Fishermyre Pond supports a population of an internationally important species not threatened or rare in the region, and the burn is not integral to maintaining this population.

**Section FL2**

- 4.1.8 Back Burn is a tributary of the Burn of Muchalls and extensive signs of otter were identified including a couch and potential couch under bridges, prints and spraint either side of the B979. Lying up opportunities exist in gorse scrub along parts of the burn. Although the burn is relatively narrow and open in places, it is likely to provide some suitable prey items and is considered to be of high value. The sighting of an adult otter by a local landowner indicates that the burn is used at present by at least one adult otter for foraging and lying up and as a commuting route between the Burn of Muchalls and burns to the west, including Fishermyre Pond. Back Burn is therefore considered to be of regional importance to otter.
- 4.1.9 The Burn of Muchalls flows directly into the sea providing connectivity between coastal and inland resources, and excellent cover is provided all along the burn and floodplain and at the confluence with Green Burn, providing habitat of very high value. This burn is likely to have been used for breeding as juvenile otter prints were recorded in downstream reaches outwith the study area. A couch was recorded near the fish ponds south of Cookney, which also offer a reliable source of fish prey, although the presence of anglers, nearby farms and the A90 may cause a degree of disturbance. Adjacent ditches are also likely to be used sporadically by foraging otter although no signs were found and they are considered unsuitable for lying up. The Burn of Muchalls otter population is considered to be of national importance due to evidence of breeding otter.

**Table 8 – Evaluation of Features for Otter in Section FL2**

Water Feature	Habitat Value	Use by Otter	Evaluation	Reason for Valuation
Back Burn	High	Foraging, commuting, lying up.	Regional	Back Burn maintains a population of this internationally important species which is not threatened or rare in the region. Lying-up sites are present along the burn.
Burn of Muchalls	Very High	Foraging, commuting, breeding, lying up.	National	The Burn of Muchalls supports a regularly occurring, county significant population of an internationally important species, evidenced by the presence of lying up sites and signs of juvenile otter which indicates the presence of breeding otter.

**Aberdeen Western Peripheral Route**  
Environmental Statement Appendices 2007  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

**Section FL3**

- 4.1.10 Like the Burn of Muchalls, the Burn of Blackbutts flows directly to the sea. Otter activity including spraints, ideal lying up opportunities and secluded foraging habitat in conjunction with low disturbance levels make this small, slow-flowing burn an important regularly-used resource for a small population of otter. The burn and habitat that it provides, including the area of bog and scrub, are considered to be of medium value and of county importance to otter.
- 4.1.11 Balnagubs Burn is identified as being of medium value to otter as it forms part of the drainage channel network used extensively by otters at the Burn of Elsick. The burn is likely to increase the extent of the foraging and potential lying resource in the area and is therefore assessed as being of county importance to otter.
- 4.1.12 The Burn of Elsick and adjoining field drains including North Rothnick Burn are identified as being of high value to otter. Three couches and at least four potential lying up sites were identified in the sheltered and undisturbed channels, which also act as an important commuting route between foraging grounds along the burns and the coast. The network of drainage channels and connecting scrub and marshy areas provide excellent seasonal foraging and year-round lying up opportunities. The Burn of Elsick and surrounding ditches are therefore considered to be of regional importance to otter.
- 4.1.13 Crossley Burn, with Whitestone Burn and Cairns Burn, is considered to be of medium value to otter as it provides an important feature connecting the Burn of Elsick and field drains in the east with Crossley Pond in the west. Although the habitat along the burn provides limited cover aside from a potential couch and moderate disturbance from cattle, the burn is considered to enhance the county habitat resource for otter.
- 4.1.14 Crossley Pond is considered to be a reliable and valuable source of fish prey in an area otherwise sparse in similar resources, although the amount of cover available outwith the immediate surroundings of the pond make it unsuitable for lying up. Otter recorded around the edge of the pond are thought to commute overland from Crynoch Burn and the Burn of Elsick along the system of field drains. Crossley Pond is therefore considered to be of medium value and county importance to otter.



**Aberdeen Western Peripheral Route**  
**Environmental Statement Appendices 2007**  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

**Table 9 – Evaluation of Features for Otter in Section FL3**

Water Feature	Habitat Value	Use by Otter	Evaluation	Reason for Valuation
Burn of Blackbutts	Medium	Foraging, commuting, potential lying up.	County	Burn of Blackbutts supports a population of an internationally important species not threatened or rare in the region, and the burn is not integral to maintaining this population.
Balnagubs Burn	Medium	Foraging, potential lying up.	County	Balnagubs Burn supports a population of an internationally important species not threatened or rare in the region, and the burn is not integral to maintaining the population.
Burn of Elsick	High	Foraging, commuting, lying up.	Regional	The Burn of Elsick and surrounding drainage network maintains a population of this internationally important species which is not threatened or rare in the region due to the quality of habitat and the presence of reliable food source.
Crossley Burn	Medium	Potential foraging, lying up and commuting.	County	Crossley Burn with Cairns Burn is likely to support a population of an internationally important species which is not threatened or rare in the region, and the burn is not integral to maintaining the population.
Crossley Pond	Medium	Foraging.	County	Crossley Pond is a foraging resource and supports a population of this internationally important species which is not threatened or rare in the region, and the pond is not integral to maintaining this population.

## 4.2 Evaluation Summary

- 4.2.1 Aberdeen is known to be an important area for otter, supporting internationally important populations in the Dee and Don catchments. The identification of otter, their signs, and their resting places along many of the watercourses within the Fastlink study area reflects this assessment.
- 4.2.2 The most important water feature in the Fastlink study area is considered to be the Burn of Muchalls, where evidence was found of breeding otter due to the presence of adult and juvenile otter footprints. Limpet Burn, Back Burn and the Burn of Elsick are considered to support regionally important groups of otter by virtue of the quality of the habitat they provide and the availability of lying up sites and potential resting places. Smaller watercourses and waterbodies, including Crossley Pond, are considered to extend the resource provided by these main burns. Signs were found along many of the drainage ditches, in particular around the Burn of Elsick, and are considered to have strategic importance to otter. These features are likely to act as landmarks along which otter may commute between foraging resources and shelter. Two burns in the study area (Coneyhatch Burn and Crossley Burn) have been assessed as being of county importance to otter. This is despite the absence of field signs due to the quality of the habitat they provide and due to their potential as an important commuting route between Green Burn and Limpet Burn as well as between the Burn of Elsick and Crossley Pond.

## **5 Potential Impacts**

### **5.1 Introduction**

- 5.1.1 The following assessment addresses the potential impacts on badger populations associated with the construction and operational phases of the proposed scheme (both short and long-term), without mitigation. Following guidance from the DMRB (Highways Agency, 2001), potential impacts would be likely to include: direct mortality, habitat loss, habitat fragmentation and isolation, disturbance and pollution and other indirect impacts.
- 5.1.2 It should be noted that the impacts associated with the operational phase of the scheme are considered to be permanent. Temporary impacts, which are only apparent while the road is being built, are discussed in association with the construction phase. In this way, burn realignments, habitat loss due to land take and other aspects of the scheme are considered to be permanent, and therefore operational impacts. In addition, it is important to recognise that the potential impacts outlined below frequently interact (i.e. habitat loss during construction could potentially result in disturbance and habitat fragmentation) and the resulting combination of impacts may, through synergistic effects, significantly increase the overall adverse impact of the proposed scheme (Iuell et al 2003).
- 5.1.3 The impact assessment is based on the evaluation of the otter population in the Fastlink study area as being of national importance.

### **5.2 General**

#### **Direct Mortality**

- 5.2.1 Otter are inquisitive animals and may be attracted onto work sites during the construction phase to investigate new machinery or spoil heaps (Highways Agency, 1999). Otter therefore risk becoming trapped in any pits, piping, chemical containers or wire mesh. As otter are largely nocturnal, any night works may also lead to otter being run-over by works vehicles. Such events are not common (Grogan et al 2001), but the otter's status as an internationally protected species means that direct mortality associated with construction of the road would constitute a main impact.
- 5.2.2 The principle cause of direct mortality resulting from operation of the scheme would be likely to be through otter being struck by vehicles as they attempt to cross the new road. Otter are highly susceptible to being killed on existing roads with 60% of all recorded deaths in the UK being attributed to road accidents (Woodroffe, 2001). Trunk and A-roads account for 57% of these RTAs, although they comprise only 13% of the road network (Philcox et al., 1999). The majority of road casualties (over 50%) occur within 100m of a watercourse (Highways Agency, 1999). This frequently occurs during high water levels. In periods of flood, otter are reluctant or unable to swim under a bridge or through a culvert due to strong currents and high flows, this being exacerbated where there is no ledge above the high water level for otter to walk along. Where otter do attempt to swim under the road during strong currents, they are liable to drown, especially in culverts that have become blocked at one end or where there is a lack of air space. Road Traffic Accidents (RTAs) may be increased where drainage ditches and burns run alongside the road as otter can be attracted onto the carriageway (Grogan et al., 2001).

**Aberdeen Western Peripheral Route**  
Environmental Statement Appendices 2007  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

- 5.2.3 Direct mortality as a result of the operational phase of the proposed scheme could adversely affect otter where the route crosses and/or comes in close proximity to watercourses that are utilised by otter. It is possible that dispersing juveniles and females could be killed either through being struck by vehicles or drowning as they attempt to swim under the road during high water levels. Females and juveniles in particular are vital in maintaining the population and their death could result in the loss of otter on some streams, which over time may lead to changes in the regional distribution of otter. Under current legislation, it is illegal to kill an otter and a potential risk of direct mortality of otter would be a key impact.

**Habitat Loss**

- 5.2.4 Loss of habitat may occur from the siting of works compounds and storage of materials. Such impacts are associated with the construction phase of the scheme due to their temporary nature. Further loss of habitat would occur during the excavation of cuttings, the construction of embankments and access roads, and the building of bridges and culverts where the road crosses watercourses. Construction is also likely to require the diversion and re-alignment of watercourses, as well as the destruction of features that may be in the vicinity of these wetland areas. Adverse impacts are predicted, especially where large areas of land adjacent to watercourses would be taken up by the presence of compounds etc., for example where junctions and bridges are proposed.
- 5.2.5 The total amount of landtake required in order to construct the Fastlink of the proposed scheme is estimated at approximately 1.20km<sup>2</sup> / 120ha. Table 10 shows the estimated total pre-construction and post-construction areas of Phase 1 Habitats present within the proposed landtake of the scheme. The post-construction figures take into account both anticipated habitat loss to construction and habitat that would be created or changed as a result of mitigation.
- 5.2.6 Although habitat loss occurs during the construction phase of the scheme, it is regarded as an operational impact as the loss would be permanent. The otter is a secretive mammal and as such, holts and couches are very important. Each individual is familiar with its home range knowing each site where shelter is available. The loss of holts and other lying-up sites would therefore place more stress on the animal, requiring it to travel further in order to find suitable cover. This may create conflict between individuals particularly where they exist at high (otter) population densities (e.g. in Aberdeen) or put them at risk to other hazards such as RTAs (Highways Agency, 1999). The intentional or reckless obstruction, damaging or destruction of holts or couches would constitute an offence under UK and European legislation as per Section 1.2.6.

**Aberdeen Western Peripheral Route**  
**Environmental Statement Appendices 2007**  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

**Table 10 – Phase 1 Habitat Areas Pre and Post Construction**

Phase 1 Habitat Description	Phase 1 Habitat Categories within proposed scheme land-take	
	Pre-construction (ha)	Post-construction (ha)
Woodland mixed plantation	2.46	13.23
Woodland broadleaved plantation (including standard trees)	0.10	0.78
Woodland broadleaved semi-natural	2.11	0.55
Woodland coniferous plantation	1.28	0.31
Scattered scrub	0.59	1.20
Dense continuous scrub	3.58	7.17
Riparian woodland	0	3.37
Acid grassland semi-improved	0.15	0.13
Acid grassland unimproved	0.40	0.19
Improved grassland	46.29	26.39
Marshy grassland	5.21	2.87
Neutral grassland semi-improved	0.26	0.21
Poor semi-improved grassland	2.96	1.51
Disturbed amenity grassland	0.83	0.37
Arable	49.21	19.64*
Built up areas (buildings)	0.49	0.49
Fen	3.87	1.41
Heath - acid grassland dry mosaic	1.88	1.67
<b>Total</b>	<b>121.67</b>	<b>81.49</b>

\*Figure assumes all potential return to agriculture is achieved.

### Habitat Fragmentation and Isolation

- 5.2.7 Construction of the road would necessitate the provision of construction compounds, storage facilities and access roads. These may prevent otter from moving freely within and between existing areas of habitat, particularly where they are situated in the vicinity of watercourses. The construction of culverts on some watercourses may act as a barrier to migratory fish movements. This could lead to a reduction of salmonid populations (see Appendix A40.9: Freshwater Ecology) and rendering upper reaches of these burns of limited use to foraging otter, with potential impacts on their suitability to otter and the availability and distribution of fish prey.
- 5.2.8 The operational scheme would also result in habitat fragmentation and form a physical barrier to otter, preventing them from moving freely within and between available areas of habitat. The scheme would therefore divide otter home ranges, possibly causing them to abandon parts of their range and making frequent road crossings. RTAs would therefore be likely as otter attempt to reach foraging and lying-up areas. Severance of an otter's home range may also place it in direct competition with other otter, thus increasing stress within the metapopulation. Otter are capable of inflicting serious and potentially fatal injuries on each other during disputes over territory (Grogan et al., 2001). The road may also restrict immigration and emigration thus decreasing genetic dispersal and increasing competition amongst currently stable populations. These impacts would be damaging to the population, removing animals that may have successfully colonised new areas in the catchment and affecting breeding.

**Aberdeen Western Peripheral Route**  
Environmental Statement Appendices 2007  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

- 5.2.9 In the long-term, the effects of fragmentation and isolation are likely to be exacerbated with culvert lengths. The longer and narrower culverts, such as those in excess of 100m long (e.g. North Cookney main culvert) pose the greatest potential for fragmentation impact to otter populations. Otters are known to use culverts longer than 100m in length, although these are generally more than 5m wide which results in slower flow rates (Jim Green pers.comm.). Research has shown that otters are less inclined to swim through structures with greater tunnel effects (which can be calculated by height between span and water x width of span/length of span) or when flows are greater, thus highlighting the importance of large structures which present otters with the option of swimming or walking alongside the watercourse (Grogan et al, 2001). It is possible that some otters may be reluctant to use narrow culverts, particularly where they are in excess of 50m long.

### **Disturbance**

- 5.2.10 Otter are likely to suffer increased disturbance during both construction and operation of the proposed road. Construction of the road would be likely to create physical disturbance which would affect the activities of otter. Noise from machinery and vehicles, light for night working, the possible obstruction of holts and otter pathways and the presence of humans can all have adverse impacts. Consideration would need to be given to avoid the inappropriate siting of construction compounds and/or storage sites during the construction phase, which could exacerbate such impacts, e.g. if they were placed close to a lying-up site. Otter may attempt to avoid any periodic disturbance, which would act as a barrier to their usual activities and deter them from using these lying-up sites resulting in the effective loss of these sites. This may cause otter to use different routes that may bring them into conflict with other otter or they may use a route that involves crossing other roads, and therefore risk being killed. Otter may also be prompted to forage further away if foraging habitat is reduced.
- 5.2.11 During the operational phase, otter would be likely to suffer disturbance from traffic noise as well as from road lighting. Otter may become accustomed to these impacts over time (for instance, it is known that otters commonly use the River Don in Aberdeen itself, e.g. at Bridge of Balgownie), but could abandon any holts or couches in the immediate vicinity of the scheme. It must also be taken into consideration that it is an offence to disturb an otter in its resting place.

### **Pollution and Other Indirect Impacts**

- 5.2.12 The potential pollution of watercourses and water features in the area could result in serious long-term damage to the productivity and diversity of nearby habitats, thus creating an adverse impact on both otter and their food supply. The construction of bridges and culverts as part of the proposed scheme may cause restrictions in river and stream channels, which would result in scouring and flooding, resulting in sediment deposition downstream and a reduction in aquatic invertebrate numbers (Grogan et al., 2001). This would have an adverse impact on fish populations, which in turn would affect otter prey availability. The damage or destruction of salmonid redds would also be possible during construction which would have equally damaging repercussions on the otter population (see Appendix A40.9: Freshwater Ecology).
- 5.2.13 The potential for accidental spillages, e.g. from oil and diesel drums would immediately reduce the amount of available prey. A particularly severe spillage leading to a bio-accumulation of contaminants in prey species (see Appendix A40.9), which may in turn accumulate in otter resulting in mortality. Being large carnivores, otter are particularly vulnerable to changes in food availability at all levels of the food chain. Pollutants such as oil and diesel can also affect thermo-regulation qualities of an otter's coat and cause mortality (Kruuk, 1995; Grogan et al., 2001).

**Aberdeen Western Peripheral Route**  
Environmental Statement Appendices 2007  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

- 5.2.14 Pollution from roads can be particularly detrimental during occurrences of storm water runoff or accidental spillage. Runoff from the operation of the proposed scheme may contain compounds used in the manufacture of cars, including zinc, cadmium and copper. Compounds such as PCBs may also be present and these have the potential to seriously affect reproduction of otter (Kruuk, 1995). There is also the possibility of spillages occurring during the operational phase and these would have impacts similar to those mentioned above. Further details regarding the impacts of pollution are presented in Appendix A40.9.

**Section FL1**

Construction

- 5.2.15 The scheme would cross Megray Burn (county importance), Limpet Burn (regional importance) and Green Burn (county importance). Direct mortality during the installation of crossings for the scheme are predicted to be of high negative magnitude and Moderate (Megray Burn and Green Burn) to Major (Limpet Burn) significance on the resident otter populations. The extensive realignment of Megray Burn and the construction of a buried structure at Limpet Burn along a high value riparian strip would be likely to cause additional disturbance resulting in high magnitude impacts on otter behaviour.
- 5.2.16 Temporary severance of a commuting route at Limpet Burn would occur if there were no provision for otters to pass through during the construction of the buried structure. This would result in a high negative magnitude and Major significant impact as this would affect the availability of resources either side of the road.

Operation

- 5.2.17 Direct mortality due to RTAs or drowning in culverts could result in high negative magnitude and Moderate impact significance where the mainline and side roads cross Megray Burn and Green Burns. The risk would be exacerbated if otters attempted to cross the road to reach the realigned section of Megray Burn, or if they were reluctant to cross through two culverts close together at Green Burn. The risk of RTA would be low at Limpet Burn as otters would be expected to readily use the buried structure which will be high and wide enough for otters to move freely underneath without resorting to climbing up onto the carriageway. The impact would be predicted to be of negligible magnitude and Negligible significance at Limpet Burn.
- 5.2.18 At Megray Burn, permanent habitat loss would occur as a result of the felling of H-Ram Wood. This would render the burn unsuitable for foraging and commuting, causing impacts of medium negative magnitude and Moderate significance overall. However the loss of invertebrate and fish prey as a result of realignment would be reinstated in the long term operation of the scheme as the realigned burn would be suitable for supporting such prey items..Loss of high value woodland and scrub habitat at Limpet Burn and the edges of Megray Wood would reduce the amount of cover in the area, although alternatives exist. The potential impacts are predicted to be of medium negative magnitude and Moderate significance. The loss of some potential lying up habitat at Fishermire Moss, at the head of Green Burn, would have an impact of medium negative magnitude of Moderate significance as the moss represents a potentially important lying up resource.
- 5.2.19 While severance would be a potentially key issue if otter could not cross the A90, the change would be unlikely to result in an increased vulnerability of the receptor population as there is already a culvert in place and otter could use the realigned burn for commuting. The impacts of severance would be predicted to be of negligible magnitude and Negligible significance at Limpet Burn during operation as otters are likely to readily use the buried structure to be provided in this location. The effects of severance at Green Burn would be predicted to be of high negative and Moderate adverse significance as the presence of two culverts may prevent otters from using the burn to reach potential lying up habitat at Fishermire, as well as the road acting as a barrier between

**Aberdeen Western Peripheral Route**  
Environmental Statement Appendices 2007  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

upstream and downstream resources including Coneyhatch Burn and Fishermyre Pond to the west.

- 5.2.20 Disturbance of foraging and commuting otters as a result of junction lighting at Megray Burn would be likely to result in an impact of medium negative magnitude and Moderate significance. Otters using Fishermyre Moss for breeding and lying up may suffer increased disturbance due to the operation of the scheme, which would be an impact of high negative magnitude and Moderate significance to the local otter population.
- 5.2.21 Pollution due to runoff from the road would be a potential impact at Megray, Limpet and Green Burns and would constitute high negative magnitude and Moderate (Megray and Green Burns) to Major (Limpet Burn) impacts on the resident otter populations if the foraging resource were affected.
- 5.2.22 No significant impacts would be predicted at Coneyhatch Burn or Fishermyre Pond (both of county importance) during the construction and operation of the scheme. Impacts on Fishermyre Pond are predicted to be of negligible magnitude and Negligible significance to the resident otters due to the distance from the scheme, and despite the proximity of Coneyhatch Burn to the scheme the burn would not be crossed and no habitat would be lost, resulting in negligible magnitude and Negligible significant impacts on the resident otter population.

## **Section FL2**

### Construction

- 5.2.23 A buried structure is proposed at the Burn of Muchalls. There would be a risk of direct mortality as a result of works being undertaken alongside the burn and disturbance at potential couch C4 or a reduction in suitability of lying up sites as a result of the proximity of works. These impacts are considered to be of high negative magnitude and Major significance as the resident otter population is of national importance as otters may breed along the burn. The scheme would pass within 50m of potential couch C3 along Back Burn (regional importance) and inappropriate siting of works would cause disturbance to otters foraging, commuting and lying up along the burn which would result in an impact of medium negative magnitude and Moderate significance.
- 5.2.24 The construction of the buried structure at the Burn of Muchalls would result in severance of the burn along an important commuting route if otters could not move freely below the road during construction. This would constitute an impact of high negative magnitude and Major significance if resources including the coast and Red Moss of Netherley were made unavailable during this period or if otter territories were severed.

### Operation

- 5.2.25 The operation of the road would not be predicted to result in direct mortality of adult or juvenile otters through RTAs as there would be adequate space under the bridge at the Burn of Muchalls to allow otters to cross under the road in spate conditions. There would be predicted to be an impact of negligible magnitude and Negligible significance to the resident otter population.
- 5.2.26 The loss of high value habitat including potential lying up and foraging habitat under the structure would be considered to be an impact of medium negative magnitude on the resident otter population as it may result in the displacement of otters (potentially breeding otters) in the area. Similarly, the effective loss of potential lying up sites including potential couch C4 due to disturbance and severance would be a high negative magnitude impact, both resulting in Major impacts on the resident otter population.
- 5.2.27 As for the operational impact of direct mortality on the local otter population the scheme would not be predicted to result in long term operational severance of a commuting route as otters would be

**Aberdeen Western Peripheral Route**  
Environmental Statement Appendices 2007  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

able to move freely under the buried structure along the Burn of Muchalls. The impact would be of negligible/Negligible magnitude and significance.

- 5.2.28 Disturbance along the Burn of Muchalls, in particular if the behaviour and territory structure of adult and juvenile otters were affected, as a result of the operation of the scheme, would be predicted to result in an impact of medium negative magnitude and Major significance if the suitability of the burn to support otters were reduced.
- 5.2.29 Pollution increased level of suspended solids in runoff would constitute high negative magnitude and impacts of Major significance along the Burn of Muchalls during operation of the road as a result of downstream impacts on an area potentially used for foraging during the raising of young.
- 5.2.30 Although the scheme would not cross Back Burn, it would pass close to it and may therefore affect the behaviour of otter using the burn for lying up, foraging or commuting by means of disturbance resulting in an impact of medium negative magnitude and Moderate significance during the operation phase. This impact would be likely to be accentuated by the fact that the same population of otters as uses the Burn of Muchalls would be affected.

### **Section FL3**

#### Construction

- 5.2.31 Crossings are proposed at Balnagubs Burn (county importance), the Burn of Elsick (regional importance) and at Crossley Burn (county importance). There would be a risk of direct mortality and disturbance as a result of construction activities, including the destruction of potential couch C10 where the road crosses Crossley Burn. These impacts would constitute high negative magnitude and Moderate (Balnagubs and Crossley Burns) to Major (Burn of Elsick) impact significance on the resident otter population in this section.
- 5.2.32 Although the scheme would pass close to the source of the Burn of Blackbutts (county importance), otters are only likely to use this part of the burn infrequently due to a lack of resources on the other side of the road. Therefore, the risk of disturbance would be considered to be of low negative magnitude and Minor significance to the otter population that uses the burn.

#### Operation

- 5.2.33 The risk of direct mortality due to RTAs or drowning in culverts would constitute a high negative magnitude and Moderate (Balnagubs Burn, Crossley Burn) to Major significance (Burn of Elsick) due to the risk of otters seeking alternative overland routes to cross the scheme if the burns become inaccessible, including at high water levels.
- 5.2.34 The loss of medium value riparian scrub habitat and the sheltered commuting route and lying up potential they provide would affect the availability of resources to otter along Balnagubs Burn and the Burn of Elsick, with medium negative magnitude and Moderate significance on the resident otter population. Similar habitat is available away from the road to the east and in Red Moss of Netherley to the west of the scheme. The destruction of potential couch C10 on Crossley Burn would have an impact of low negative magnitude and Minor significance on the resident otter population. This is due to the overall low suitability of the habitat at the crossing for otters and because alternative suitable lying up sites exist away from the road. Habitat loss would constitute an impact of negligible magnitude and Negligible significance at the source of the Burn of Blackbutts due to the low value of the habitat in this area and the lack of resources on the western side of the burn.
- 5.2.35 The barrier effects of the proposed scheme through this section would affect the movement of otters between the sea and features to the west of the scheme including Red Moss of Netherley (a possible breeding area) and Crossley Pond (a foraging resource supporting a county important



**Aberdeen Western Peripheral Route**  
Environmental Statement Appendices 2007  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

population of otters). This would be likely to result in impacts of medium negative magnitude and Moderate significance on the resident otter population where the scheme crosses at Balnagubs Burn, the Burn of Elsick and Crossley Burn, although alternative routes are likely to exist including via Crynoch Burn from the north.

- 5.2.36 Pollution impacts of low negative magnitude and Minor significance are predicted where the scheme would pass close to the source of the Burn of Blackbutts. It is anticipated that there would be a low risk of downstream impacts (including on the Burn of Muchalls of which the burn is a tributary) if not mitigated for. Pollution impacts are predicted to be of medium negative magnitude and Moderate significance where the scheme crosses Balnagubs Burn and the Burn of Elsick. The potential downstream impacts of a pollution incident on this burn, particularly cumulatively as a result of other crossings on tributary burns, would be likely to result in substantial changes to the suitability of the foraging resource. It would be considered unlikely to permanently affect the integrity of the burn to support otters. The pollution risk at Crossley Burn would be predicted to be of low negative magnitude and Minor significance due to the shallow nature of the burn at this location.
- 5.2.37 There would be no direct impacts predicted during the construction or operation of the proposed scheme on Crossley Pond. Potential indirect impacts on the pond, including severance and barrier effects from other watercourses, have been discussed above.

**Aberdeen Western Peripheral Route**  
**Environmental Statement Appendices 2007**  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

**Table 11 – Table of Potential Impacts.**

Water Feature	Crossing Point(s)	Phase of Scheme	Impacts	Impact Magnitude/Significance
Section FL1				
Megray Burn (County)	AWPR Mainline (ch0)	Construction	Otters are likely to forage and commute along the burn and lie up in H-Ram Woodland and may therefore suffer direct mortality or disturbance from construction activities, especially during burn realignment.	High negative/Moderate
		Operation	<p>Increased risk of direct mortality through RTAs where the scheme crosses Megray Burn</p> <p>Burn would be realigned with associated long term loss of foraging and lying up habitat including H-Ram Wood, pond and riffle/pool structure of the burn. Realignment and straightening would result in short-term reduction in prey availability which would recover in the long term.</p> <p>Scheme would be unlikely to cause further severance as otter movements are already impeded by the A90.</p> <p>Increased disturbance and unsuitability of burn for foraging due to operation of the road, including due to junction lighting at the A90.</p> <p>Risk of deterioration in water quality due to runoff from the scheme. The burn flows into Cowie Water and ultimately the sea, therefore increasing the significance of the impact.</p>	<p>High negative /Moderate</p> <p>Medium negative/Moderate</p> <p>Negligible/Negligible</p> <p>Medium negative/Moderate</p> <p>High negative/Moderate</p>
Limpet Burn (Regional)	AWPR Mainline (ch1400)	Construction	<p>Otters forage along the burn and lie up in woodland reaches and may therefore suffer direct mortality or disturbance during bridge construction, especially during burn realignment.</p> <p>Scheme would result in severance of Limpet Burn along a commuting route between the sea and upstream resources including Megray Burn, Fishermyre Moss and Fishermyre Pond.</p>	<p>High negative /Major</p> <p>High negative/Major</p>
		Operation	<p>Increased risk of direct mortality through RTAs and/or drowning where scheme crosses burn</p> <p>Loss of high value riparian woodland habitat at the edge of Megray Wood and in the valley due to burn realignment and including increased disturbance in Megray Wood which is likely to be used for lying up.</p> <p>Severance along a commuting route would be reduced as otters are likely to cross readily through the buried structure with no permanent impacts on the integrity of the population.</p> <p>The length of the bridge may impact on water quality due to lack of light and fish populations may be affected by oxygen sag. There may also be pollution due to particulates downstream including ponds and associated foraging habitat.</p>	<p>High negative/Major</p> <p>Medium negative/Moderate</p> <p>Negligible/Negligible</p> <p>High negative/Major</p>

**Aberdeen Western Peripheral Route**  
**Environmental Statement Appendices 2007**  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

Water Feature	Crossing Point(s)	Phase of Scheme	Impacts	Impact Magnitude/Significance
Green Burn (County)	AWPR Mainline (ch3125); Side Road (ch213)	Construction	Otters are likely to forage regularly and cross between Green Burn and Fishermyre Moss and may therefore suffer direct mortality or disturbance during construction	High negative/Moderate
		Operation	Increased risk of direct mortality through RTAs where scheme crosses burn and between burn and adjacent resources including Coneyhatch Burn and Fishermyre Moss/Pond	High negative/Moderate
			Some loss of medium value habitat comprising moorland and scrub at edge of Fishermyre Moss and associated secluded lying up habitat	Medium negative/Moderate
			Scheme would cause severance of commuting route between Green Burn and lying up habitat and resources including Fishermyre Moss and Pond, Coneyhatch Burn to the west of the scheme. Disturbance likely if otters are breeding or lying up in Fishermyre Moss	High negative/Moderate High negative/Moderate
		Risk or deterioration in water quality due to runoff from the scheme. Burn is likely to be an important foraging resource and is upstream of the Burn of Muchalls	High negative/Moderate	
Coneyhatch Burn (County)	n/a	Construction	Minimal disturbance likely due to distance from scheme	Negligible/Negligible
		Operation	Minimal disturbance likely due to distance from scheme; severance of probable commuting routes is assessed under Green Burn.	Negligible/Negligible
Fishermyre Pond (County)	n/a	Construction	Minimal disturbance likely due to distance from scheme	Negligible/Negligible
		Operation	Minimal disturbance likely due to distance from scheme; indirect severance of commuting routes from Green Burn and Limpet Burn assessed above.	Negligible/Negligible
<b>Section FL2</b>				
Back Burn (Regional)	n/a	Construction	Scheme passes within 50m of potential couch C3; disturbance possible if otters are lying up along the burn.	Medium negative/Moderate
		Operation	Scheme passes within 50m of burn; disturbance possible due to operation of road	Medium negative/Moderate
Burn of Muchalls (National)	AWPR Mainline (ch4700)	Construction	Otters, including juveniles, are likely to forage along the burn regularly and lie up in woodland reaches and may therefore suffer direct mortality or disturbance from construction activities. Additional disturbance possible at potential couch C4.	High negative/Major
			Scheme would result in severance of the Burn of Muchalls along a commuting route between the sea and upstream resources including Back Burn, Red Moss of Netherley, ponds and habitats further along the burn.	High negative/Major

**Aberdeen Western Peripheral Route**  
**Environmental Statement Appendices 2007**  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

Water Feature	Crossing Point(s)	Phase of Scheme	Impacts	Impact Magnitude/Significance
		Operation	<p>Risk of mortality likely to be low as the buried structure will be wide enough for otters to move freely along the banks either side of the channel.</p> <p>Loss of high value habitat comprising riparian woodland and associated foraging and potential lying up habitat adjacent to Burnside Farm.</p> <p>Severance of habitat would not occur as the buried structure will be wide enough for otters to move freely along the banks either side of the channel.</p> <p>Scheme would increase disturbance to otters if lying up along burn and may reduce the suitability of the burn for otters</p> <p>The length of the bridge may impact on water quality due to lack of light and fish populations may be affected by oxygen sag. There may also be pollution due to particulates downstream. Burn is likely to be an important foraging resource.</p>	<p>Negligible/Negligible</p> <p>Medium negative/Major</p> <p>Negligible/Negligible</p> <p>Medium negative/Major</p> <p>High negative/Major</p>
<b>Section FL3</b>				
Burn of Blackbutts (County)	n/a	Construction	Scheme passes close to the source of the burn and otter may therefore suffer some disturbance	Low negative/Minor
		Operation	<p>Minimal loss of low value commuting, foraging and lying up habitat comprising pasture and marshy grassland due to the scheme crossing at source of burn away from potential lying up sites.</p> <p>Scheme may cause severance of commuting route although proximity to the source of the burn, lack of resources immediately to the west of the scheme and availability of alternative commuting routes reduces the overall impact. The integrity of the burn to support otters would not be affected.</p> <p>Risk of deterioration in water quality downstream due to runoff from the scheme.</p>	<p>Negligible/Negligible</p> <p>Negligible/Negligible</p> <p>Low negative/Minor</p>
Balnagubs Burn (County)	AWPR Mainline (ch7550)	Construction	Scheme crosses the burn which is likely to be used regularly by otters for foraging and lying up; otters may therefore suffer direct mortality and disturbance during construction activities	High negative/Moderate
		Operation	<p>Increased risk of direct mortality through RTAs and/or drowning where scheme crosses burn</p> <p>Loss of medium* value foraging and potential lying up habitat comprising riparian scrub and pasture.</p> <p>Scheme would sever otter movements between the sea and Red Moss of Netherley although other commuting routes exist at Balnagubs Burn and Crossley Burn</p>	<p>High negative/Moderate</p> <p>Medium negative/Moderate</p> <p>Medium negative/Moderate</p>

**Aberdeen Western Peripheral Route**  
**Environmental Statement Appendices 2007**  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

Water Feature	Crossing Point(s)	Phase of Scheme	Impacts	Impact Magnitude/Significance
			Risk of deterioration in water quality due to runoff from scheme. Although otters are only likely to use the burn infrequently the burn flows into the Burn of Elsick which flows into the sea, which increases the significance of this impact	Medium negative/Moderate
Burn of Elsick (Regional)	AWPR Mainline (ch7975)	Construction	Scheme crosses the burn which is likely to be an important otter foraging and commuting resource; otters may therefore suffer direct mortality and disturbance during construction activities	High negative/Major
		Operation	Increased risk of direct mortality through RTAs and/or drowning where scheme crosses burn	High negative/Major
			Loss of medium* value foraging and potential lying up habitat comprising riparian scrub and pasture. Scheme would sever otter movements between the sea and resources in the west including Red Moss of Netherley and Crynoch Burn, although other commuting routes exist Risk of deterioration in water quality due to runoff from the scheme. Otters are likely to use the burn regularly as a foraging resource	Medium negative/Moderate Medium negative/Moderate Medium negative/Moderate
Crossley Burn (County)	AWPR Mainline (ch9170)	Construction	Scheme crosses the burn which is likely to be used infrequently by commuting and potentially lying up otters; otters may therefore suffer direct mortality or disturbance from construction activities	High negative/Moderate
		Operation	Increased risk of direct mortality through RTAs where scheme crosses burns Loss of potential couch C10 and low value habitat comprising pasture Scheme would sever otter movements between the Burn of Elsick and Crossley Quarry Pond/Crynoch Burn along a probable commuting route, although alternative commuting routes exist Risk of deterioration in water quality low due to shallow nature of burn in this section	High negative/Moderate Low negative/Minor Medium negative/Moderate Negligible/Negligible
			Construction and Operation	Minimal disturbance likely due to distance from scheme; indirect severance of commuting routes from burn of Elsick assessed above.

\* refers to the value of habitat at the crossing location, not to the overall value of habitat along the watercourse, as per Section 4 and in Appendix 40.16.

## **5.3 Summary**

- 5.3.1 In the absence of appropriate mitigation measures, the construction of the road is likely to result in temporary, localised impacts on otters wherever site compounds and access roads are located near to watercourses. This is of particular concern when otter and their lying up sites are disturbed or the accessibility of foraging and lying up resources is altered.
- 5.3.2 Most longer-term impacts would be associated with the operation of the proposed scheme. Direct mortality caused by road accidents is the greatest cause of recorded otter mortality in the UK. Without mitigation measures in place, comparatively more otter may be killed on roads than at present with impacts on otter at all geographical scales.
- 5.3.3 Pollution incidents resulting from the proposed scheme have the potential to result in changes to the local population. Disturbance during construction and operation would be likely to affect the availability of lying up opportunities for otter. The road is likely to render a number of couches and holts unsuitable for use due to proximity to the road or by obstructing their access routes.

## **6 Mitigation**

### **6.1 Introduction**

- 6.1.1 New road schemes and improvements to existing roads that do not take the requirements of otter into account in their design and construction may adversely affect existing populations. The otter's status is still considered vulnerable enough to warrant its inclusion in the Biodiversity Steering Group Report (1995) as a target species. This resulted in the Joint Nature Conservation Committee (JNCC) producing A Framework for Otter Conservation in the UK: 1995-2000 (1996). These documents recognise road casualties as one of the main factors affecting otter populations and that specific work is required to reduce the impacts of road construction and operation (Grogan et al., 2001). There are several main targets in providing mitigation for otter on the UK road network, and they need to be considered in road design, construction and operation:
- minimise disturbance and adverse impacts on otter;
  - maintain access for otter to their present habitats;
  - allow existing otter populations to expand and colonise new areas; and
  - reduce the numbers of RTAs involving otter.
- 6.1.2 This requires careful planning by designers and constructors, so that important habitats and migration routes are not destroyed and the provision of more sensitive watercourse crossings where otter may be present.
- 6.1.3 Mitigation measures presented in this report are primarily based on advice given in the Design Manual for Roads and Bridges: Nature Conservation Advice in Relation to Otters (Highways Agency 1999) and Nature Conservation and Roads: Advice in Relation to Otters (Grogan et al., 2001), and would help the above targets to be achieved in relation to the AWPR. In addition correspondence was undertaken with SNH.
- 6.1.4 The mitigation measures provided form a hierarchy of measures to be adopted and comprise prevention/avoidance, reduction and offset measures. All of the mitigation measures described in this chapter have been developed in consultation with the appropriate statutory advisory organisation, i.e. SNH and will compliment the Species Management Plan that will be prepared. The Species Management Plan will include details on habitat management and methodologies to promote long-term conservation objectives.

**Aberdeen Western Peripheral Route**  
Environmental Statement Appendices 2007  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

## **6.2 General**

### **Direct Mortality**

#### Construction

- 6.2.1 During the construction phase, direct mortality of otter will be avoided through the implementation of the following measures.
- 6.2.2 Holes/pits will be covered at night or mammal ramps positioned to allow any trapped animals to escape.
- 6.2.3 Where otter are known to be active, they must be excluded from the dangerous areas on the site by erecting temporary otter proof fencing in such a way that commuting routes are not disrupted. Temporary otter proof fencing will consist of chestnut paling fence with stakes at 25mm gaps or stiff plastic mesh that otter cannot scale. Where temporary fencing is erected, it must be positioned to guide otter to safe routes through the working areas. Safe routes may include underpasses for site access and haul roads, these will have an internal diameter of at least 600mm. The advice of SNH will be sought prior to any such activities and their advice followed. Initially, this advice will be sought in the form of the development of 'ghost licences', which will mirror the contents of the full licence. This approach will enable the development of a method and the full information required to ensure SNH are confident that the approach will fulfil the conservation regulations and maintain the favourable conservation status of the species concerned.
- 6.2.4 Night working will not be permitted where the proposed scheme comes within 30m of any watercourse to reduce the risk of otter being run over by construction traffic.

#### Operation

- 6.2.5 During operation of the scheme, direct mortality of otter will be avoided through the implementation of the mitigation measures described below.
- 6.2.6 Permanent otter-proof fencing will be erected along both sides of the carriageway (in conjunction with the provision of sufficient safe crossing points) wherever the scheme comes within 150m of a watercourse or where it severs or passes between areas of otter habitat
- 6.2.7 Otter-proof fencing to DMRB standard (Highways Agency 1999) will be combined with badger fencing and underpasses (see Appendix A40.2: Badger) and will be maintained to ensure that otters cannot gain access to the carriageway. Where fencing extends for several hundred metres and there is no stream crossing, underpasses will be installed (as per the badger report in Appendix A40.2). The minimum internal diameter of the underpass must be 900mm and be as straight as possible.
- 6.2.8 Where fencing extends for several hundred metres and there is no watercourse crossing, underpasses will be installed. The minimum internal diameter of the underpass must be 900mm and be as straight as possible. Fencing and underpasses installed as part of the mitigation for badgers, (see Appendix A25.2: Badger) will also benefit otter.
- 6.2.9 Watercourse crossings will be constructed to enable the safe passage of otter. Where bridges or buried structures are proposed (such as Limpet Burn and the Burn of Muchalls), space between the abutments and the watercourse will enable otter to pass safely during high water levels (0.1% AEP (Annual Event Probability) and provision must be made for otters to gain access to the water at such structures. Ledges must also be incorporated in the bridge design.

**Aberdeen Western Peripheral Route**  
Environmental Statement Appendices 2007  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

- 6.2.10 Where the proposed scheme crosses smaller watercourses, depressed invert box culverts designed to 0.5% AEP will be provided as these do not fill as rapidly as cylindrical culverts and can therefore be used more easily by swimming otters. Culverts will be fitted with dry ledges that are accessible during high water levels (0.01 AEP). These mammal ledges will be made of solid concrete integral with the culvert and will be 500mm wide and be accessible both from the bank and the water by the provision of ramps or groups of large boulders. Ledges will be sited at least 150mm above the appropriate high flood level, allowing 600mm headroom. Where appropriate otter will be guided to the ledge by planting dense scrub on the opposite bank or providing the ledge on the appropriate side of the culvert. Further surveys will be undertaken prior to the construction of these ledges in order to ascertain which bank otter are travelling along.

### **Habitat Loss**

#### Construction

- 6.2.11 Temporary habitat loss is likely to result during establishment of construction works compounds, storage sites and access roads. Therefore, these must be sited at least 30m away from any watercourse and avoid areas of woodland, dense scrub and/or wetland to prevent valuable areas of otter habitat being degraded. Where the loss or degradation of valuable habitat is unavoidable, it must be returned to its former quality or better once construction is completed. Improvements may include the planting of trees such as willow, oak and ash along riverbanks while emergent vegetation and dense scrub such as bramble should be encouraged.
- 6.2.12 In addition to the above, habitat creation for other species groups such as birds and amphibians (see Bird and Amphibian Reports respectively, Appendix 40.4 and the Amphibian section of Chapter 40) will also indirectly provide mitigation for otter, particularly where close to waterbodies. Further details regarding habitat restoration can be found in the Appendix 40.1 (Terrestrial Habitats).
- 6.2.13 Where over-grazing is a current problem, an opportunity exists during construction to fence off areas of land adjacent to watercourses, encouraging vegetation growth. Where mature trees along riverbanks need to be removed, the root systems should be retained to provide potential holt sites where this is practical in terms of engineering works. Where the proposed scheme would result in damage to river and stream banks these must be protected using large concrete blocks (1000mm diameter approximately) piled together to create attractive cavities for otter (Hans Kruuk, pers. comm.). However, potential lying-up sites must only be created where the safety of otter can be assured by restricting their access to the carriageway.
- 6.2.14 Realigned sections of watercourses will be reinstated to as near a natural state as possible. Where this is feasible, there may be an opportunity to create new channels with meanders and riparian planting along the inside of bends. In addition to minimising the loss of riparian habitat, this will also encourage otter to pass the proposed scheme safely.

### **Habitat Fragmentation and Isolation**

- 6.2.15 Works compounds, storage sites and access roads will, where possible, be located away from important areas of otter habitat to prevent severance of commuting routes. Disturbance at these areas will be minimised as above. Access roads must have otter underpasses installed, thus enabling otter to move freely throughout their home range. The construction of bridges and other structures may also cause obstructions that otter must negotiate. One side of the river or stream being bridged must therefore remain intact for as long as possible to provide safe access, and the area around the water course to be disturbed will be minimised by the provision of temporary barriers and safe working areas.
- 6.2.16 The operation of the proposed scheme must not prevent otter from moving freely within and between available areas of habitat. This will necessitate the construction of bridges and culverts



**Aberdeen Western Peripheral Route**  
Environmental Statement Appendices 2007  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

where the road dissects watercourses and these must allow the safe passage of otter during spate conditions. Field ditches will be incorporated into pre-earthworks drainage. Where extensive stretches of the road are fenced, dry underpasses must be installed under the road to enable otter to move between habitats. In addition the provision of dry mammal underpasses for badgers may provide additional crossing points (see badger report in Appendix A40.2) connecting areas of habitat so that otters may pass safely.

## **Disturbance**

### Construction

- 6.2.17 During construction, site compounds, storage or waste dumping facilities will be located at least 30m away from any holt/couch or watercourse. If holts or couches are likely to be disturbed by any construction activities or if access routes are to be blocked, a Scottish Executive Environment and Rural Affairs Department (SEERAD) licence must be acquired prior to work. An Ecological Clerk of Works will be on site during construction of the scheme.
- 6.2.18 Contractors will be provided with an overview of otter ecology prior to works commencing. The locations of all holts and couches will be identified to contractors in confidence to ensure that they are not accidentally disturbed during the construction process. Such areas must be fenced with signs to clearly mark that contractors must not enter. Site clearance must be preceded by a thorough survey of the area for holts, couches and otter. Once this has been completed the working area must be fenced to prevent otter returning.
- 6.2.19 If a holt or couch is discovered during construction, an exclusion zone of 30m must be established and all works suspended. If an occupied breeding site is found, it may lead to the cessation of work for up to 10 weeks until cubs are mobile and able to leave the area.
- 6.2.20 Night working (one hour after sunset to one hour before sunrise) will not be permitted where the scheme comes within 30m of a holt/couch or watercourse in order to prevent disturbance to otter and their routines.

### Operation

- 6.2.21 Disturbance caused by the operation of the scheme will be partially mitigated for through the planting undertaken to minimise landscape and visual impacts, as described in Chapter 41 (Landscape) and Chapter 42 (Visual). The planting of natural screens along the scheme will reduce noise and light disturbance to otter. Areas of lighting will be restricted to major junctions (the A90 and Cleanhill Junctions) so levels of lighting will be low where the operational scheme crosses or runs parallel to watercourses thus reducing disturbance to otters. Screening for landscape impacts will also reduce the intermittent impacts of lighting on watercourses.

## **Pollution and Other Indirect Impacts**

- 6.2.22 During construction, contractors must adhere to SEPA best practice guidelines with regards to preventing pollution incidents. The relevant guidelines include:
- PPG1: General Guide to the Prevention of Water Pollution;
  - PPG3: The Use and Design of Oil Separators;
  - PPG5: Works In, Near, or Liable to Affect Watercourses; and
  - PPG6: Working at Construction and Demolition Sites.
- 6.2.23 Pollution control measures will necessitate the installation of drainage systems to divert runoff into drains, soak-aways and detention basins thus avoiding contamination of watercourses. This will benefit otters through the protection of local watercourses from road runoff pollution. Detention

**Aberdeen Western Peripheral Route**  
Environmental Statement Appendices 2007  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

basins will be fenced for health and safety purposes which would also act to deter otters from gaining access and becoming trapped. Drainage systems must be grilled to prevent otter entering and becoming trapped.

- 6.2.24 Chemical and oil storage tanks will be set back at least 10m from any watercourse and secondary containment must be provided to prevent pollution incidents from occurring. Construction vehicles will be prohibited from crossing watercourses used as breeding grounds by salmonid fish and silt traps will be installed. Disturbance to streambeds must generally be kept to a minimum to prevent erosion and siltation. The operational scheme will also require the installation of a safe drainage system. Further details regarding pollution control during construction and operation are outlined in Chapter 39 and Appendix 40.9.

### **Monitoring**

#### Construction

- 6.2.25 Otter habitats and lying-up sites are subject to change over time. Further surveys will be conducted immediately prior to the start of construction. This will involve re-surveying all watercourses and waterbodies within 100m of the alignment as well as checking the status of existing holts and couches. If any new otter lying-up sites be found, mitigation will be adjusted as required. The discovery of any holts or couches being used for breeding will necessitate the suspension of all works in that area until the cubs have left the holt/couch.

#### Operation

- 6.2.26 Regular maintenance of culverts and dry underpasses (as per badger report in appendix A25.2) to ensure they are clear of blockages will also ensure that these crossings can continue to be used by otter. Fencing must also be examined regularly to check for damage and corrosion. In this respect, it is important that maintenance of mitigation measures is carried out.
- 6.2.27 Post-construction monitoring will be required on an annual basis over the first five years to check for signs of otter, assess the status of holts and other lying-up sites and to record any RTAs. This will help gauge how otter are adapting to the new scheme and whether the mitigation measures have been effective in helping to maintain the otter population and preventing RTAs. Based on the results of these surveys, alterations and/or enhancements may be necessary.

### **6.3 Specific Mitigation**

- 6.3.1 The mitigation measures described previously are to be applied as minimum requirements where the construction and operation of the road are likely to result in adverse impacts on the otter population. Further mitigation has been specified where the impact significance is assessed as being of Moderate significance or above.
- 6.3.2 Specific mitigation requirements have been summarised in Table 12 and are presented in Figures 41.5a-k.

**Aberdeen Western Peripheral Route**  
**Environmental Statement Appendices 2007**  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

**Table 12 – Table of Specific Mitigation Measures**

Direct Mortality	Habitat Loss	Habitat Fragmentation and Isolation	Disturbance	Pollution and Other Indirect Impacts
<b>Section FL1</b>				
<p>Construction            Generic mitigation as prescribed in 6.2.1-6.2.4.            Operation            Otter-proof fencing to be fitted at <b>ch0-1550 and ch2300 – 4850</b>            Installation of depressed invert culvert with integral mammal ledge at crossing of Megray and Green Burns (see Table 13).            Fencing and underpasses provided for badgers will also serve as mitigation for otters. The extent of badger fencing and locations of badger underpasses can be found in the Badger Report in Appendix 40.2 and on Figures 41.5a - d</p>	<p>Construction            Generic Mitigation as prescribed in 6.2.11-6.2.14, including the incorporation of underpasses under site access roads            Operation            Riparian woodland planting to be undertaken alongside realigned Megray Burn to mitigate against loss of H-Ram wood (E01).            Riparian woodland planting to be undertaken adjacent to Limpet Burn in such a way as not to attract otters up the bank to the road; to replace loss of potential lying up habitat (E03).            Scattered wet woodland planting at Fishermyre Moss to offset loss of scrub (E05, E07)</p>	<p>Construction            Generic Mitigation as prescribed in 6.2.15.            Operation            Installation of depressed invert culverts with integral mammal ledges at crossing of Megray Burn and Green Burn (see Table 13).</p>	<p>Construction            Generic mitigation as prescribed in 6.2.17-6.2.20, including the exclusion of work compounds from Limpet Burn.            Operation            Generic mitigation as prescribed in 6.2.21, including minimisation of lighting at the A90 junction, no lighting along the carriageway and riparian and woodland planting around junction and along carriageway to screen views as per Chapter 41 Landscape and E01, E03 and E07.</p>	<p>Construction &amp; Operational phases:            Generic mitigation as prescribed in 6.2.22 and 6.2.23, and in the Freshwater Report in Appendix 40.9</p>
<b>Section FL2</b>				
<p>Construction            Generic mitigation as prescribed in 6.2.1-6.2.4.            Operation            Otter-proof fencing to be fitted at. ch2300 – 4850 as per Section FL1; and at ch5175 – 5750.            Installation of buried structure with integral mammal ledge at the Burn of Muchalls (see Table 13).            Fencing and underpasses provided for badgers will also serve as mitigation for otters. The extent of badger fencing and locations of badger underpasses can be found in the Badger Report in Appendix 40.2 and on Figures 41.5d - f</p>	<p>Construction            Generic Mitigation as prescribed in 6.2.11-6.2.14, including the incorporation of underpasses under site access roads.            Potential couches C3 and C4 will be monitored pre-construction and replacement couches will be provided elsewhere along the burns if used by otters.            Operation            Riparian planting to offset loss of habitat adjacent to the Burn of Muchalls and to minimise disturbance along Back Burn (E08, E09, E10).</p>	<p>Construction            Generic Mitigation as prescribed in 6.2.15.            Operation            Installation of buried structure with integral mammal ledges at the Burn of Muchalls (see Table 13).</p>	<p>Construction            Generic mitigation as prescribed in 6.2.17-6.2.20, including the exclusion of work compounds from the Burn of Muchalls, in particular potential couch C4.            Operation            Generic mitigation as prescribed in 6.2.21, including no lighting along the carriageway and scrub woodland and riparian planting along the carriageway as per Chapter 41 Landscape and E08 – E09.</p>	<p>Construction &amp; Operational phases:            Generic mitigation as prescribed in 6.2.22 and 6.2.23, and in the Freshwater Report in Appendix 40.9</p>

**Aberdeen Western Peripheral Route**  
**Environmental Statement Appendices 2007**  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

Direct Mortality	Habitat Loss	Habitat Fragmentation and Isolation	Disturbance	Pollution and Other Indirect Impacts
<b>Section FL3</b>				
<p>Construction            Generic mitigation as prescribed in 6.2.1-6.2.4.</p> <p>Operation            Otter-proof fencing to be fitted at ch5175 – 5750 as per Section SL2; and at ch6375 – 7090, ch7400 – 8200 and ch8575 – Cleanhill Junction.</p> <p>Installation of depressed invert culverts with integral mammal ledges at North Cookney Main and Side road, Stoneyhill Ditch, Balnagubs Burn, the Burn of Elsick, Whiteside Burn, Crossley Burn and Craigentath Burn (refer to Table 13).</p> <p>Fencing and underpasses provided for badgers will also serve as mitigation for otters. The extent of badger fencing and locations of badger underpasses can be found in the Badger Report in Appendix 40.2 and on Figures 41.5f - k</p>	<p>Construction            Generic Mitigation as prescribed in 6.2.11-6.2.14, including the incorporation of underpasses under site access roads.</p> <p>Potential couch C10 will be monitored pre-construction and replacement couch will be provided elsewhere along the burn if used by otters.</p> <p>Operation            Scrub planting to offset the loss of habitat and promote the use of culverts by otter (E14, E15). Replacement of potential couch C10 if shown to be used by otters prior to construction.</p>	<p>Construction            Generic Mitigation as prescribed in 6.2.15.</p> <p>Operation            Installation of buried structure with integral mammal ledges at the Burn of Muchalls (refer to Table 13).</p> <p>Installation of underpass at ch5600 planted with scrub (E12) to facilitate usage.</p>	<p>Construction            Generic mitigation as prescribed in 6.2.17-6.2.20, including the exclusion of work compounds from the Burn of Muchalls.</p> <p>Operation            Generic mitigation as prescribed in 6.2.21, including no lighting along the carriageway. Screening as per Chapter 41 Landscape will reduce potential disturbance impacts on watercourses in this Section.</p>	<p>Construction &amp; Operational phases:            Generic mitigation as prescribed in 6.2.22 and 6.2.23, and in the Freshwater Report in Appendix 40.9.</p>

**Aberdeen Western Peripheral Route**  
**Environmental Statement Appendices 2007**  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

**Table 13 – Watercourse Crossing Structures**

Water feature	Chainage/location	Crossing type	Length (m)	Width (m)	Height (m)	Additional Information
Section FL1						
Megray Burn	AWPR Mainline (ch0)	Culvert	92	2.4	1.2	Integral mammal ledge on west bank
Limpet Burn	AWPR Mainline (ch1400)	Buried structure	69.5	12.5	11	Integral mammal ledge on north bank.
Green Burn	AWPR Mainline (ch3125)	Culvert	84	2.7	1.5	Integral mammal ledge on north bank
	Side road (ch213)	Culvert	19	2.7	1.5	Integral mammal ledge on north bank
Section FL2						
Burn of Muchalls	AWPR Mainline (ch4625)	Buried structure	34	12	4.3	Integral mammal ledge on south bank.
Section FL3						
North Cookney Main	AWPR Mainline (ch6480)	Culvert	42	2.4	1.5	Integral mammal ledge on west bank
North Cookney Side	Side road (ch6480)	Culvert	53	2.4	1.5	Integral mammal ledge on west bank
Stoneyhill Ditch	AWPR Mainline (ch6700)	Culvert	36	2.4	1.2	Integral mammal ledge on north bank
Balnagubs Burn	AWPR Mainline (ch7550)	Culvert	48	2.4	1.2	Integral mammal ledge on south bank
Burn of Elsick	AWPR Mainline (ch7975)	Culvert	53	2.7	1.5	Integral mammal ledge on north bank
Whiteside Burn	AWPR Mainline (ch8850)	Culvert	62	2.4	1.2	Integral mammal ledge on north bank
Crossley Burn	AWPR Mainline (ch9170)	Culvert	87	2.4	1.2	Integral mammal ledge on north bank
Craigentath Burn	AWPR Mainline (ch10630)	Culvert	67	2.4	1.5	Integral mammal ledge on north bank

## 6.4 Summary

- 6.4.1 Otters are frequently killed on trunk and A-roads (Philcox et al., 1999) and adequate fencing on both sides of the carriageway is a vital component of mitigation. Evidence from radio-tracking and from studies of the distribution of road casualties shows that otter will use small burns and ditches, including dry watercourses, for feeding and as regular commuting routes (Kruuk et al 1998; Chanin, 2003). In terms of mitigation, every culvert that will be installed for the scheme will include a mammal ledge, which will allow otters to cross. This will ensure that otter can continue to commute along watercourses. The provision of appropriately located fencing and underpasses will also ensure that otter can cross the scheme safely
- 6.4.2 The most important areas of otter habitat would not be affected by the scheme. Where valuable areas would be lost, the loss of habitat will be mitigated through re-planting and the creation of additional habitat. The provision of ponds as mitigation for other species such as amphibians (see Chapter 40: Ecology and Nature Conservation) will also benefit otter.
- 6.4.3 The loss of otter holts and couches is more difficult to mitigate for and therefore every effort will be made to avoid the destruction of these.

**Aberdeen Western Peripheral Route**  
Environmental Statement Appendices 2007  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

- 6.4.4 The destruction or disturbance of an otter holt/couch will require a special derogation under the European Habitats Directive. A licence to undertake such works will be obtained from SEERAD, which will include a method statement. Detailed methodologies for holt exclusions and artificial holt design will be outlined in this method statement. Any measures that are needed to protect otter will be in place prior to the start of the construction phase. Similarly, any mitigation required during the construction phase will be installed prior to the commencement of construction. It is essential that all personnel working on site are aware of the mitigation in place and of the obligations. All the mitigation measures discussed in this section must be fully operational before the road scheme is opened to traffic.

## **7 Residual Impacts**

### **7.1 General**

#### **Direct Mortality**

- 7.1.1 With the effective implementation of the mitigation measures described in this report, the construction and operational phases of the scheme are not predicted to compromise the long-term viability of the otter population in the study area. It is acknowledged that it may take time for otters to adjust to the new scheme and use culverts and underpasses.
- 7.1.2 Otters will be able to continue their night journeys within the confines of the existing river/waterway corridors they are using, therefore negating the need to cross the carriageway. The provision of badger fencing in conjunction with otter fencing (see Figures 41.5a-k.) will prevent otters from finding their way onto the carriageway and avert potential RTAs at the highest risk areas.. Individual RTAs may occasionally occur where otters are taking terrestrial routes and entering the carriageway via unfenced side roads. However, these are unlikely to affect the viability of the local population. Such local impacts may be balanced overall by reduced traffic flows on existing roads (which lack appropriate structures designed to accommodate otter crossing such as bridges, culverts and fencing), which is predicted to result in a reduction in RTAs on these routes.

#### **Habitat Loss**

- 7.1.3 The proposed scheme would not result in the loss of large areas of highly valuable areas of otter habitat as the road would pass through primarily agricultural land, which is of minimal value to otters. Strips of high value riparian habitat along Limpet Burn and the Burn of Muchalls would be lost due to the need to construct crossing structures over these watercourses.
- 7.1.4 While no actual holts or couches would be lost to the scheme, potential couch C10 would be destroyed. Other habitat with the potential for lying up would also be destroyed and the scheme would pass close to potential lying up sites at the Burn of Muchalls and Back Burn. This may cause temporary stress to otters lying-up along the burn, although the habitat creation of replacement riparian habitat at either side end of the crossing structures as per the terrestrial habitat reports in Appendix A40.2 will ensure that minimal disruption is caused to habitats of otters in the long-term.

#### **Habitat Fragmentation and Isolation**

- 7.1.5 In the short-term, the scheme would result in the severance of home ranges especially when taking into account the large sizes of otter ranges. However, it is expected that otters may soon become accustomed to using the crossing structures that have been incorporated into the design of the road and otters will be able to follow their natural behaviour patterns.
- 7.1.6 In the long-term, the effects of fragmentation and isolation are likely to be exacerbated with culvert lengths. The longer and narrower culverts, pose the greatest potential for fragmentation impact to otter populations. Taking into consideration that most culverts along the Fastlink would be less

**Aberdeen Western Peripheral Route**  
Environmental Statement Appendices 2007  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

than 3m wide, there is potential that some otters may be reluctant to use them, particularly where they are in excess of 50m long.

**Disturbance**

- 7.1.7 The completed scheme would increase the overall level of disturbance to otters, as a consequence of the watercourse crossings or that the road would run parallel to watercourses. The implementation of the mitigation described in this report should ensure that disturbance is kept to a minimum during construction, particularly in the vicinity of watercourses where exclusion zones will be put in place. Lighting is only likely to be an issue close to the proposed A90 Junction, near Megray Burn.
- 7.1.8 The operational scheme would be in close proximity (approximately 50m) to several potential lying-up sites, although otters may become accustomed to increased noise levels over time. This would be assisted by the sympathetic design of planting adjacent to the scheme. The main residual impacts resulting from disturbance are associated with the construction phase. These impacts are temporary and will be reduced to a minimal level by the mitigation measures proposed.

**Pollution and Other Indirect Impacts**

- 7.1.9 The implementation of the mitigation suggested should ensure that the risk of pollutants reaching any watercourse is negligible and therefore there should be no adverse impact on otters. The installation of culverts and diversion of watercourses is however, likely to destroy aquatic invertebrate habitat and result in scouring and sedimentation to some extent. This may have an adverse impact on fish populations, which would in turn have adverse consequences for otters.

**7.2 Specific Residual Impacts**

- 7.2.1 The results of the assessment of residual impacts on the otter population in the Fastlink study area are presented in Table 13.

**Aberdeen Western Peripheral Route**  
**Environmental Statement Appendices 2007**  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

**Table 14 - Residual Impacts**

Water Feature	Phase of Scheme	Potential Impact Description	Impact Magnitude/Significance	Residual Impacts	Residual Impact Magnitude/Significance
Section FL1					
Megray Burn (County)	Construction	Otters are likely to forage and commute along the burn and lie up in H-Ram Woodland. May suffer direct mortality or disturbance from construction activities, especially during burn realignment.	High negative/Moderate	Best practice guidelines will be followed during construction including the suspension of night time works within 30m of the watercourse and holt/couch. Work compound sites will be established away from valuable areas of habitat. This will ensure that minimal disturbance is caused to otters using the burn.	Negligible/Negligible
	Operation	Increased risk of direct mortality through RTAs where the scheme crosses Megray Burn	High negative/Moderate	Culverts with integral mammal ledges will be constructed where the scheme crosses the burn, allowing otters to continue their nightly journeys within the confines of the burn corridor. The erection of otter/badger proof fencing will prevent otters finding their way onto the carriageway.	Negligible/Negligible
		Burn would be realigned with associated long term loss of foraging and lying up habitat including H-Ram Wood, pond and riffle/pool structure of the burn. Realignment and straightening would result in short term reduction in prey availability which would recover in the long term.	Medium negative/Moderate	Scrub and riparian planting in this area will mitigate for the loss of existing habitat, although this will take some time to mature. Loss of invertebrate and fish habitat along realigned reach of the burn will be minimised through careful design of realignment, while best practice guidelines will be adhered to.	Low negative/Minor
		Scheme is unlikely to cause further severance as otter movements are already impeded by the A90.	Negligible/Negligible	The installation of culverts at crossing points will allow otters to move freely within and between available areas of habitat. The culvert on Megray Burn would be approximately 92m long, and some otters may be reluctant to use it. However, the A90 already severs the burn and it is unlikely that the proposed scheme will have any overall impact on otter movements.	Negligible/Negligible
		Increased disturbance and unsuitability of burn for foraging due to operation of the road including junction lighting at the A90	Medium negative/Moderate	Otters are likely to become accustomed to lighting especially with the proposed riparian and woodland planting in place. As such, disturbance is likely to be minimal in the long-term.	Negligible/Negligible



**Aberdeen Western Peripheral Route**  
**Environmental Statement Appendices 2007**  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

Water Feature	Phase of Scheme	Potential Impact Description	Impact Magnitude/Significance	Residual Impacts	Residual Impact Magnitude/Significance
		Risk of deterioration in water quality due to runoff from the scheme. The burn flows into Cowie Water and ultimately the sea, therefore increasing the potential extent of impacts across the area.	Medium negative/Moderate	Road drainage collection and treatment system will ensure that road runoff entering the burn complies with Environmental Quality Standards.	Negligible/Negligible
Limpet Burn (Regional)	Construction	Otters forage along the burn and lie up in woodland reaches and may therefore suffer direct mortality or disturbance during bridge construction, especially during construction of the burn realignment.	High negative/Major	Best practice guidelines will be followed during construction including the suspension of night time works within 30m of the watercourse and holt/couch. Work compound sites will be established away from valuable areas of habitat. This will ensure that minimal disturbance is caused to otters using the burn.	Negligible/Negligible
		Scheme would result in severance of Limpet Burn along a commuting route between the sea and upstream resources including Megray Burn, Fishermyre Moss and Fishermyre Pond	High negative/Major	Commuting routes to remain open on both banks during buried structure construction. This will ensure that minimal disturbance is caused to otters using the burn .	Low negative/Minor
	Operation	Increased risk of direct mortality through RTAs and/or drowning where scheme crosses burn	High negative/Major	Construction of a buried structure with adequate clearance either side of the realigned burn will ensure otters can pass without having to climb up to the road during high water levels. The installation of otter/badger proof fencing will prevent otters finding their way onto the carriageway.	Negligible/Negligible
		Loss of high value riparian woodland habitat at the edge of Megray Wood and in the valley due to burn realignment. Increased disturbance to Megray Wood, which is likely to be used for lying up.	Medium negative/Moderate	Riparian planting in this area will provide mitigation for the loss of existing habitat, although this will take some time to mature and the section under the buried structure will be irreversibly lost. Loss of invertebrate and fish habitat along realigned reach of the burn will be minimised through careful design of realignment, while best practice guidelines will be adhered to.	Low negative/Minor
		Severance along a commuting route would be reduced as otters are likely to cross readily through the buried structure with no permanent impacts on the integrity of the population.	Negligible/Negligible	The construction of a buried structure with space between the burn and walls will allow otters to move freely within and between available areas of habitat.	Negligible/Negligible
		There may be pollution of watercourse and associated foraging habitat if road runoff not treated.	High negative/Major	Road drainage collection and treatment system will ensure that road runoff entering the burn complies with Environmental Quality Standards.	Negligible/Negligible

**Aberdeen Western Peripheral Route**  
**Environmental Statement Appendices 2007**  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

Water Feature	Phase of Scheme	Potential Impact Description	Impact Magnitude/Significance	Residual Impacts	Residual Impact Magnitude/Significance
Green Burn (County)	Construction	Otters are likely to forage regularly and cross between Green Burn and Fishermyre Moss and may therefore suffer direct mortality or disturbance during construction	High negative/Moderate	Best practice guidelines will be followed during construction including the suspension of night time works within 30m of the watercourse and holt/couch. Work compound sites will be established away from valuable areas of habitat. This will ensure that minimal disturbance is caused to otters using the burn.	Negligible/Negligible
	Operation	Increased risk of direct mortality through RTAs where scheme crosses burn and between burn and adjacent resources including Coneyhatch Burn and Fishermyre Moss/Pond	High negative/Moderate	Construction of a buried structure with adequate clearance either side of the realigned burn will ensure otters can pass without having to climb up to the road during high water levels. The installation of otter/badger proof fencing will prevent otters finding their way onto the carriageway.	Negligible/Negligible
		Some loss of medium value habitat comprising moorland and scrub at edge of Fishermyre Moss and associated secluded lying up habitat	Medium negative/Moderate	Scrub planting in this area will partially mitigate for the loss of existing habitat, although this will take some time to mature.	Low negative/Minor
		Scheme would result in severance of commuting route between Green Burn and lying up habitat and resources including Fishermyre Moss and Pond, Coneyhatch Burn to the west of the scheme.	High negative/Moderate	The construction of culverts at crossing points will allow otters to move within and between available areas of habitat. However, one of the culverts at this location is approximately 84m long and some otters may be reluctant to use it. Other routes exist, which would maintain a level of connectivity.	Medium negative/Moderate
		Disturbance likely if otters are breeding or lying up in Fishermyre Moss	High negative/Moderate	Otters are likely to become accustomed to disturbance especially with the proposed riparian and scrub planting in place. As such, disturbance is likely to be minimal in the long-term.	Negligible/Negligible
Risk or deterioration in water quality due to runoff from the scheme. Burn is likely to be an important foraging resource and is upstream of the Burn of Muchalls	Medium negative/Moderate	Road drainage collection and treatment system will ensure that road runoff entering the burn complies with Environmental Quality Standards.	Negligible/Negligible		
Coneyhatch Burn (County)	Construction	Minimal disturbance likely due to distance from scheme	Negligible/Negligible	None predicted due to distance from scheme.	Negligible/Negligible
	Operation	Minimal disturbance likely due to distance from scheme; severance of probable commuting routes is assessed under Green Burn.	Negligible/Negligible	None predicted due to distance from scheme.	Negligible/Negligible

**Aberdeen Western Peripheral Route**  
**Environmental Statement Appendices 2007**  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

Water Feature	Phase of Scheme	Potential Impact Description	Impact Magnitude/Significance	Residual Impacts	Residual Impact Magnitude/Significance
Fishermyle Pond (County)	Construction	Minimal disturbance likely due to distance from scheme	Negligible/Negligible	None predicted due to distance from scheme.	Negligible/Negligible
	Operation	Minimal disturbance likely due to distance from scheme. Indirect severance of commuting routes from Green Burn and Limpet Burn assessed above.	Negligible/Negligible	None predicted due to distance from scheme.	Negligible/Negligible
<b>Section FL2</b>					
Back Burn (Regional)	Construction	Scheme passes within 50m of potential couch. Disturbance possible if otters are lying up along the burn.	Medium negative/Moderate	Implementation of best practice guidelines and demarcation of the burn within 30m of active otter lying up sites will ensure that otters are not killed or disturbed during construction.	Negligible/Negligible
	Operation	Scheme passes within 50m of burn. Disturbance possible due to operation of road.	Medium negative/Moderate	Otters are likely to become accustomed to disturbance as a result of the proposed scrub and riparian planting. As such, disturbance is likely to be minimal in the long-term.	Negligible/Negligible
Burn of Muchalls (National)	Construction	Otters, including juveniles, are likely to forage along the burn regularly and lie up in woodland reaches and may therefore suffer direct mortality or disturbance from construction activities. Additional disturbance possible at potential couch C4.	High negative/Major	Implementation of best practice guidelines and demarcation of the burn within 30m of active otter lying up sites (50m of possible breeding sites) will ensure that otters are not killed or disturbed during construction. Best practice guidelines will be followed during construction including the suspension of night time works within 30m of the watercourse and holt/couch and siting works compounds away from valuable areas of habitat. This will ensure that minimal disturbance is caused to otters using the burn	Negligible/Negligible
		Scheme would result in severance of the Burn of Muchalls along a commuting route between the sea and upstream resources including Back Burn, Red Moss of Netherley, ponds and habitats further along the burn.	High negative/Major	Commuting routes to remain open on both banks during buried structure construction. This will ensure that minimal disturbance is caused to otters using the burn.	Low negative/Minor
	Operation	Risk of mortality likely to be low as the buried structure will be wide enough for otters to move freely along the banks either side of the channel.	Negligible/Negligible	Construction of a buried structure with adequate clearance on the south bank side of the burn to ensure otters can pass without having to climb up to the road during high water levels. The installation of otter/badger proof will prevent otters finding their way onto the carriageway.	Negligible/Negligible

**Aberdeen Western Peripheral Route**  
**Environmental Statement Appendices 2007**  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

Water Feature	Phase of Scheme	Potential Impact Description	Impact Magnitude/Significance	Residual Impacts	Residual Impact Magnitude/Significance
		Loss of high value habitat comprising riparian woodland and associated foraging and potential lying up habitat adjacent to Burnside Farm.	Medium negative/Major	Riparian planting in this area will mitigate for the loss of existing habitat, although this will take some time to mature and the section under the buried structure will be irreversibly lost. Best practice guidelines will be adhered to ensure no overall loss of habitat.	Low negative/Minor
		Severance of habitat would not be predicted as the buried structure will be wide enough for otters to move freely along the banks either side of the channel.	Negligible/Negligible	The construction of a buried structure with space between the burn and walls will allow otters to move freely within and between available areas of habitat.	Negligible/Negligible
		Scheme would increase disturbance to otters if lying up along burn and may reduce the suitability of the burn for otters	Medium negative/Major	Otters are likely to become accustomed to disturbance as a result of the proposed scrub and riparian planting. As such, disturbance is likely to be minimal in the long-term.	Negligible/Negligible
		The length of the bridge may impact on water quality due to lack of light and fish populations may be affected by oxygen sag. There may also be pollution due to particulates downstream. Burn is likely to be an important foraging resource.	High negative/Major	Road drainage collection and treatment system will ensure that road runoff entering the burn complies with Environmental Quality Standards.	Negligible/Negligible
<b>Section FL3</b>					
Burn of Blackbutts (County)	Construction	Scheme passes close to the source of the burn and otter may therefore suffer some disturbance	Low negative/Minor	Best practice guidelines will be followed during construction including the suspension of night time works within 30m of a watercourse or holt/couch and siting works compounds away from valuable areas of habitat. This will ensure that minimal disturbance is caused to otters using the burn.	Negligible/Negligible
	Operation	Minimal loss of low value commuting, foraging and lying up habitat comprising pasture and marshy grassland due to the scheme crossing at source of burn away from potential lying up sites.  Scheme may cause severance of commuting route although proximity to the source of the burn, lack of resources immediately to the west of the scheme and availability of alternative commuting routes reduces the overall impact; unlikely to be a permanent impact on the integrity of the burn to support otters	Negligible/Negligible  Negligible/Negligible	No further mitigation required. Habitat creation and enhancement elsewhere along the scheme will offset the loss of low value habitat and may enhance the suitability for otters.  Provision of underpass at the head of the burn, planted with scrub woodland to enhance the likelihood of being used will provide crossing point and offset the severance of the burn. This is unlikely to be a permanent impact on the integrity of the burn to support otters.	Negligible/Negligible  Negligible/Negligible

**Aberdeen Western Peripheral Route**  
**Environmental Statement Appendices 2007**  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

Water Feature	Phase of Scheme	Potential Impact Description	Impact Magnitude/Significance	Residual Impacts	Residual Impact Magnitude/Significance
		Risk of deterioration in water quality downstream due to runoff from the scheme.	Low negative/Minor	Road drainage collection and treatment system will ensure that road runoff entering the burn complies with Environmental Quality Standards.	Negligible/Negligible
Balnagubs Burn (County)	Construction	Scheme crosses the burn which is likely to be used regularly by otters for foraging and lying up; otters may therefore suffer direct mortality and disturbance during construction activities	High negative/Moderate	Best practice guidelines and demarcation of the burn within 30m of active otter lying up sites to ensure that otters are not killed or disturbed during construction. Best practice guidelines will be followed during construction including the suspension of night time works within 30m of the watercourse and holt/couch and siting works compounds away from valuable areas of habitat. This will ensure that minimal disturbance is caused to otters using the burn	Negligible/Negligible
	Operation	Increased risk of direct mortality through RTAs and/or drowning where scheme crosses burn	High negative/Moderate	The installation of culverts with mammal ledges and the use of scrub planting to promote usage will allow otters to continue their night journeys within the confines of the burn corridor. The erection of otter/badger proof fencing will prevent otters finding their way onto the carriageway.	Negligible/Negligible
		Loss of medium value foraging and potential lying up habitat comprising riparian scrub and pasture.	Medium negative/Moderate	Scrub planting to encourage the use of culvert by otters will offset loss of habitat and cover for otters and provide a screen from disturbance from the road.	Negligible/Negligible
		Scheme would sever otter movements between the sea and Red Moss of Netherley although other commuting routes exist at Balnagubs Burn and Crossley Burn	Medium negative/Moderate	The construction of culverts at crossing points will allow otters to move freely within and between available areas of habitat.	Negligible/Negligible
		Risk of deterioration in water quality due to runoff from scheme. Although otters are only likely to use the burn infrequently the burn flows into the Burn of Elsick which flows into the sea, which increases the significance of this impact	Medium negative/Moderate	Road drainage collection and treatment system will ensure that road runoff entering the burn complies with Environmental Quality Standards.	Negligible/Negligible

**Aberdeen Western Peripheral Route**  
**Environmental Statement Appendices 2007**  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

Water Feature	Phase of Scheme	Potential Impact Description	Impact Magnitude/Significance	Residual Impacts	Residual Impact Magnitude/Significance
Burn of Elsick (Regional)	Construction	Scheme crosses the burn which is likely to be an important otter foraging and commuting resource; otters may therefore suffer direct mortality and disturbance during construction activities	High negative/Major	Best practice guidelines and demarcation of the burn within 30m of active otter lying up sites to ensure that otters are not killed or disturbed during construction. Best practice guidelines will be followed during construction including the suspension of night time works within 30m of the watercourse and holt/couch and siting works compounds away from valuable areas of habitat. This will ensure that minimal disturbance is caused to otters using the burn	Negligible/Negligible
	Operation	Increased risk of direct mortality through RTAs and/or drowning where scheme crosses burn	High negative/Major	The installation of a culvert with mammal ledges and the use of scrub planting to promote usage will allow otters to continue their night journeys within the confines of the burn corridor. The erection of otter/badger proof fencing will prevent otters finding their way onto the carriageway.	Negligible/Negligible
		Loss of medium value foraging and potential lying up habitat comprising riparian scrub and pasture.	Medium negative/Moderate	Scrub planting to encourage the use of culvert by otters will offset loss of habitat and cover for otters and provide a screen from disturbance from the road.	Negligible/Negligible
		Scheme would sever otter movements between the sea and resources in the west including Red Moss of Netherley and Crynoch Burn, although other commuting routes exist	Medium negative/Moderate	The construction of culverts planted with scrub to promote use will allow otters to move within and between available areas of habitat. However, the culvert at the Burn of Elsick would be approximately 62m long and some otters may be reluctant to use the culvert, however, other routes exist which will maintain connectivity.	Low negative/Minor
		Risk of deterioration in water quality due to runoff from the scheme. Otters are likely to use the burn regularly as a foraging resource	Medium negative/Moderate	Road drainage system will ensure that road runoff entering the burn complies with Environmental Quality Standards.	Negligible/Negligible

**Aberdeen Western Peripheral Route**  
**Environmental Statement Appendices 2007**  
**Part D: Fastlink**  
**Appendix A40.5 – Otter Report**

Water Feature	Phase of Scheme	Potential Impact Description	Impact Magnitude/Significance	Residual Impacts	Residual Impact Magnitude/Significance
Crossley Burn (County)	Construction	Scheme crosses the burn which is likely to be used infrequently by commuting and potentially lying up otters; otters may therefore suffer direct mortality or disturbance from construction activities	High negative/Moderate	Best practice guidelines and demarcation of the burn within 30m of active otter lying up sites to ensure that otters are not killed or disturbed during construction. Best practice guidelines will be followed during construction including the suspension of night time works within 30m of the watercourse and holt/couch and siting works compounds away from valuable areas of habitat. This will ensure that minimal disturbance is caused to otters using the burn.	Negligible/Negligible
	Operation	Increased risk of direct mortality through RTAs where scheme crosses burns	High negative/Moderate	The installation of a culvert with mammal ledges and the use of scrub planting to promote usage will allow otters to continue their night journeys within the confines of the burn corridor. The erection of otter/badger proof fencing will prevent otters finding their way onto the carriageway.	Negligible/Negligible
		Loss of potential couch C10 and low value habitat comprising pasture	Low negative/Minor	Potential couch will be monitored prior to construction and replaced if required elsewhere along the burn.	Negligible/Negligible
		Scheme would sever otter movements between the Burn of Elsick and Crossley Quarry Pond/Crynoch Burn along a probable commuting route, although alternative commuting routes exist	Medium negative/Moderate	The installation of culverts at crossing points will allow otters to move within and between available areas of habitat. However, one of the culverts would be approximately 87m long, and some otters may be reluctant to use it, however, other routes exist to maintain connectivity.	Low negative/Minor
		Risk of deterioration in water quality low due to shallow nature of burn in this section	Negligible/Negligible	Road drainage system will ensure that road runoff entering the burn complies with Environmental Quality Standards.	Negligible/Negligible
Crossley Pond (County)	Construction and Operation	Minimal disturbance likely due to distance from scheme; indirect severance of commuting routes from burn of Elsick assessed above.	Negligible/Negligible	None predicted due to distance from scheme.	Negligible/Negligible

### **7.3 Residual Impacts Summary**

- 7.3.1 With the incorporation of mitigation measures detailed in this report, the construction and operation of the Fastlink are unlikely to compromise the viability and integrity of the currently healthy otter population. Those impacts remaining despite mitigation are largely due to the design specifications of watercourse crossings, with culverts being favoured to bridges. The installation of long and confined culverts, in particular those in excess of 50m long, may sever home ranges and act as barriers to otter movements, although it is expected that otters would gradually become accustomed to these culverts.
- 7.3.2 In some areas where there are no plans currently to replace high and medium value habitat that would be lost, such as at Limpet Burn and the Burn of Muchalls, would be likely to result in residual impacts of Minor significance due to the irreversible loss of relatively small areas of potential lying up habitat.
- 7.3.3 While a road scheme of this scale would inevitably result in some residual impacts on otter populations, there are also likely to be some benefits. One such benefit would be a reduction in local traffic flows and RTAs along the existing road network, which currently has no mitigation measures to protect otter in place.



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