



Appendix A40.8 – Deer Survey

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1 Introduction

1.1 General Background

- 1.1.1 This report is concerned with the impacts of the Fastlink section of the proposed scheme on deer populations. Consideration is also given to collision risk.
- 1.1.2 To aid the interpretation of the assessment, the Fastlink has been sub-divided into three component route sections 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 Studies on deer were included as part of the Ecological Impact Assessment (EclA) and 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 (as amended), IEEM (2002) Guidelines for Ecological Impact Assessment, along with cognisance of draft Institute of Ecology and Environmental Management (IEEM) guidelines (2006).
- 1.1.5 These studies included desk-based consultation to collate existing information about deer in the area which would be affected by the proposed scheme and incidental observations collected during other ecological field surveys undertaken in 2004, 2005 and 2006 to provide current data about the status of deer populations.
- 1.1.6 For the purpose of this report, the study area is defined as comprising all areas within 500m either side of the centreline of the proposed scheme.

Aims

- 1.1.7 Road traffic accidents (RTAs) involving deer are a historic problem on British roads, known to cause approximately 300 human personal injury accidents and a number of human fatalities every year (Langbein and Putman, 2005). The cost to the Scottish economy of deer-related RTAs has been estimated as £5 million in human injuries annually with a further £1 million in vehicle damage (Putman et al., 2004).
- 1.1.8 Consequently, this survey was designed to establish the relative magnitude and frequency of deer movement, and thus interaction with the proposed scheme. The impact of the proposed scheme on deer welfare is also considered. The survey aims were to:
- determine the presence, distribution and activity levels of deer;
 - identify areas of likely, frequent deer movement;
 - identify any areas that could represent a high risk of deer collision to motorists; and
 - provide recommendations, where appropriate.
- 1.1.9 An assessment of collision risk, drawn from the results of the above, has informed the development of appropriate mitigation measures.

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Deer Biology

- 1.1.10 Of the six species of deer established in the wild in Britain, two are native and four have been introduced.
- 1.1.11 Roe deer (*Capreolus capreolus*), a native species, was the only deer species recorded within the study area and therefore only the biology of this species will be discussed.
- 1.1.12 Roe deer stand on average 75cm high at the shoulder, with the larger bucks weighing up to approximately 32kg. They are widespread and common throughout Scotland and utilise a wide variety of habitats for lying up or feeding, including arable land, grassland, heathland, thick scrub, deciduous and coniferous woodland. Roe deer are selective browsers, their diet comprising buds, shoots, herbs, shrubs and fungi; they also graze on grasses (Deer UK, 2004). Mating occurs from mid-July to August, and following delayed implantation one to three young are born in May or June the following year.
- 1.1.13 In summer, roe deer are usually solitary or occur in small groups consisting of a doe and her kids and sometimes a buck. Yearlings of both sexes may accumulate to form a non-territorial group with larger feeding aggregations of 10 - 30 individuals occurring in large fields during the winter. Home ranges vary widely between average sizes of 0.3 – 1.7km², the smallest ranges occurring in woodland landscapes and largest in farmland areas. Over-winter pre-breeding densities in the UK commonly vary from around 3 – 30 per km², with highest densities usually achieved in areas offering a high proportion of woodland cover (Langbein, 2004).
- 1.1.14 As ruminants, roe deer spend substantial periods of time alternatively feeding and “lying-up.” These activities will often take place in distinct but spatially contiguous habitats offering different feeding and cover resources, necessitating movement between them. This generally follows a diurnal pattern with a greater proportion of feeding taking place during the hours of darkness or at dusk and dawn. Movement therefore predominately, but not exclusively, takes place around this time.

Legal Status

- 1.1.15 Roe deer in Britain are not threatened or declining and as such all legislation pertinent to this species relates to prevention of animal cruelty.
- 1.1.16 Under the Deer (Scotland) Act 1996, the Deer Commission for Scotland (DCS) has responsibilities to ‘further the conservation, control and sustainable management of deer in Scotland and keep under review all matters, including their welfare, relating to deer’ (Section 1(1)a). In addition, the Commission has powers to control deer where and when they pose a threat to public safety.

Risks to Road Traffic

- 1.1.17 A recent scoping study identified road traffic accidents as one of the main concerns with respect to both deer welfare and public safety (DCS Annual Report, 1998-99).
- 1.1.18 Estimates provided to the Highways Agency suggest that for the UK, accident rates involving deer are between 20,000 and 42,000 per year with perhaps 20% of these occurring in Scotland (SGS Environment, 1998).

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- 1.1.19 Records and statistics for roe deer in Scotland (Staines et al., 2001) show that the incidence of reported road traffic accidents (RTAs)¹ appear to be greater:
- within or close to woodland (over 90% of accidents);
 - during the hours of darkness between 8pm and midnight;
 - the months of May and June;
 - at dusk and dawn especially during autumn and winter, and;
 - on sections of road where speeds are habitually highest.

2 Approach and Methods

2.1 Previous Survey Information

- 2.1.1 A review of published and archived material was undertaken. The material included an initial report (Road traffic accidents and deer in Scotland; Staines et al., 2001), produced for the DCS, reviewing data that were actively sought from organisations. These include regional police authorities, insurance companies, Forest Enterprise, deer management groups and county councils.

2.2 Deer Assessment Methods

Collation of Incidental Sightings and RTA Records

- 2.2.1 Relative deer utilisation along the route corridor was estimated by collating incidental records noted during surveys for other species. Ecological surveys were performed in all the route sections. Most were conducted during daylight hours and some during the early morning and late evening.
- 2.2.2 Incidental records included observations of field signs such as moulted hair, lair depressions, droppings, prints (slots) and tracks, together with any sightings of adult deer and kids. Any deer road casualties were also recorded and supplemented by additional deer collision records supplied by Dr Jochen Langbein, via the National Deer collisions project (see Annex 1).
- 2.2.3 Incidental sightings from Jacobs surveyors were gathered during protected species and Phase 1 Habitat Surveys 500m either side of the centreline of the proposed route alignment (refer to Figures 40.1a-f). The incidental records were made whilst conducting animal and plant surveys over a 25 week period between 14 February 2006 and 24 August 2006.
- 2.2.4 Any deer road casualties were also recorded, and supplemented by additional deer collision records supplied by Dr Jochen Langbein, via the National Deer collisions project (see Annex 1).

¹ For this report RTAs refer to any deer-related collision with road traffic and are sometimes referred to in literature as Deer Vehicle Collisions (DVCs).

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Evaluation of Deer Activity

- 2.2.5 The evaluation of deer activity (relative within the study area) is based on the presence, frequency and distribution of deer sightings and incidence of field signs encountered in the local environment for each section within the route corridor. The proximity to the alignment of wooded areas considered suitable to provide lying-up habitat to a population of roe deer was also considered.
- 2.2.6 The following criteria were used to evaluate habitat considered to be of importance/value to deer populations:
- high deer activity – an area that contains extensive woodland and abundant sightings of individuals and field signs.
 - medium-high deer activity – an area that contains extensive woodland or scrub and a moderate level of deer sightings and/or field signs.
 - medium deer activity – an area that contains extensive woodland or scrub together with either sightings of individuals or the presence of field signs.
 - medium-low deer activity – an area that contains limited woodland together with sightings of individuals and/or a presence of field signs.
 - low deer activity - an area that contains limited woodland and infrequent sightings of individuals or field signs.
- 2.2.7 This evaluation reflects the common and local status of roe deer in the study area and does not reflect a value in conservation terms. As such, an assessment of the magnitude and significance of impact to deer is not required. Instead, an assessment of the magnitude of risk from RTAs to public safety and deer welfare shall be used.

Risk Assessment

- 2.2.8 An increased risk of RTAs might occur at sections of the proposed scheme that sever or pass close to existing areas of woodland or other suitable areas where there are medium to high levels of deer activity. In addition, increased risk would be likely where the driver's line of sight is obstructed, such as in the immediate vicinity of earthworks and/or where the road passes over the crests of hills. The risk assessment assigns a level of magnitude to a particular area along the alignment of the proposed scheme. The magnitude of risk is based on the following parameters:
- where the proposed scheme would sever woodland habitat;
 - the proximity of woodland and scrub to the proposed scheme;
 - the level of deer activity; and
 - obstruction of a driver's line of sight to deer that are in the immediate vicinity and on associated earthworks of the proposed carriageway.
- 2.2.9 These parameters are combined to determine the level of risk using the following criteria:
- high risk – where the proposed scheme would sever or crop woodland together with a medium to high deer activity and/or potential obstruction to a driver's line of sight
 - medium risk – where the proposed scheme would pass within 100m of woodland/scrub together with a medium to high deer activity and/or potential obstruction to a driver's line of sight
 - low risk – where the proposed scheme would pass in excess of 100m, but less than 300m from an area of woodland.
- 2.2.10 The risk assessment findings informed identification of appropriate mitigation measures along the proposed scheme to reduce the risk of collision.

3 Baseline

3.1 Data search

- 3.1.1 Records on deer-related road traffic accidents in Scotland are under-reported as there is no obligation on individuals to report such accidents. As a result, there is a lack of comprehensive studies relating to deer and road traffic accidents for Scotland.
- 3.1.2 Consultation was undertaken with Scottish Natural Heritage (SNH), North East Scotland Biological Records Centre (NESBReC) and Dr Jochen Langbein.
- 3.1.3 Dr Langbein is an independent consultant with 25 years experience of researching deer populations in the UK. He is currently project leader for the National Deer Collisions Project, which aims to compile a national database of deer-related accidents and examine factors associated with the road environment, deer ecology and deer management. Data from the DCS report were made available by Dr Langbein.
- 3.1.4 The DCS report (Road traffic accidents and deer in Scotland; Staines et al., 2001) was compiled from reviewed data supplied by several organisations. In general the quantity and quality of these data were highly variable. Only records that submitted a date, time and location were accepted for analysis. Results from this information revealed certain consequences of RTAs that include; fate of deer, human injuries and car damage. Also revealed were factors associated with RTAs, which include; species of deer, season of year, time of day and roadside habitats.
- 3.1.5 Staines et al. (2001) highlighted the scarcity of reliable past information on numbers and locations of deer/vehicle collisions in Scotland. A nationwide study (The National Deer Collisions Database; www.deercollisions.co.uk) has since been launched with support from the Scottish Executive to research and collate as high a proportion of known deer/vehicle collisions as possible from 2003 - 2005 inclusive.
- 3.1.6 The results from the DCS report together with more recent information from the National Deer Collisions project provided useful background information for identifying risk and the level of risk in areas along the route of the proposed scheme. The report also provided an informative guide to available and successful mitigation techniques that are presently in place on operational road schemes.

3.2 Survey Results

- 3.2.1 Roe deer were present throughout the study area. All areas of land offering suitable cover, e.g. woodland, dense / continuous scrub, and continuous bracken had one or more field signs present, with lairs and droppings the most prolific field signs. Deer were sighted in most woodland areas from Stonehaven to Cleanhill Wood (Sections FL1 to FL3). Deer sightings were less common in areas of open ground; in particular, the area from North Cookney to Blaikiewell Farm which comprises predominantly improved grassland, arable fields and some marshy areas. However, recorded data of deer signs indicated that virtually all areas are used by deer when foraging / commuting from one area of cover to another. Survey results are shown in Table 1.
- 3.2.2 The RTA records were provided for the all areas of the proposed route by Dr Jochen Langbein (refer to Annex 1). A proportion of the deer road casualty records from 2003 - 2005 were recorded in the vicinity of some sections of the route; in particular, the A90 north of Stonehaven (five records) and the B9077 around Fishermyme (three records). RTAs are presented in Figures 40.11a-f.

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Table 1 - Field Survey Results and RTA Records (Sections FL1 – FL3)

Areas of Deer Habitat	OS Grid Reference	Figure No.	Field Signs Encountered	Deer Sighting	Number of RTA Records and Distance from Alignment
Section FL1					
Megray Burn	NO 873 877	40.11b	Yes	No	5 records on A90 within 800m
Megray Wood	NO 873 886	40.11b	Yes	Yes	
	NO 874 888	40.11b	Yes	Yes	
	NO 872 889	40.11b	Yes	Yes	
	NO 873 889	40.11b	Yes	No	
	NO 874 889	40.11b	Yes	No	
	NO 871 891	40.11b	Yes	Yes	
Limpet Burn Wood	NO 876 888	40.11b	Yes	Yes	
	NO 879 888	40.11b	Yes	Yes	
Kempstone Hill	NO 876 895	40.11b	Yes	Yes	
Whitemyres Wood	NO 868 899	40.11b	Yes	Yes	
White Hill	NO 865 900	40.11b	Yes	Yes	
North Fishermyle	NO 866 902	40.11b	Yes	Yes	3 records within 200m
Section FL2					
South of Allochie	NO 866 908	40.11c	Yes	Yes	
	NO 866 914	40.11c	Yes	Yes	
North of Allochie	NO 865 915	40.11c	Yes	Yes	
Burnorrachie	NO 876 915	40.11c	Yes	No	
Burn of Muchalls, South of Elrick	NO 871 919	40.11c	Yes	No	
	NO 865 923	40.11c	Yes	Yes	
North of Clayfolds	NO 877 923	40.11c	Yes	No	
	NO 880 923	40.11c	Yes	No	
	NO 876 927	40.11c	Yes	Yes	
Harecraig, North East of Cookney	NO 881 934	40.11d	Yes	Yes	
Section FL3					
Backhill	NO 869 935	40.11d	Yes	Yes	
North Cookney	NO 875 935	40.11d	Yes	Yes	
Red Moss	NO 864 938	40.11d	Yes	No	
	NO 860 939	40.11d	Yes	Yes	
	NO 856 946	40.11d	Yes	Yes	
North Rothnick	NO 875 952	40.11e	Yes	Yes	
East Rothnick	NO 877 959	40.11e	Yes	No	
Berrytop	NO 857 961	40.11e	Yes	No	
Stranog Hill	NO 864 966	40.11e	Yes	Yes	
Burnside Wood	NO 854 976	40.11f	Yes	Yes	
North of Burnside Wood	NO 853 979	40.11f	Yes	Yes	
Invercrynock Cottage	NO 859 978	40.11f	Yes	Yes	
	NO 860 978	40.11f	Yes	Yes	
	NO 861 976	40.11f	Yes	Yes	
Polston	NO 861 980	40.11f	Yes	Yes	
Blaikiewell	NO 864 981	40.11f	Yes	Yes	

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Areas of Deer Habitat	OS Grid Reference	Figure No.	Field Signs Encountered	Deer Sighting	Number of RTA Records and Distance from Alignment
South of Burnhead	NO 874 981	40.11f	Yes	No	
West of Burnhead	NO 873 986	40.11f	Yes	Yes	

4 Evaluation

4.1.1 The distribution and frequency of deer sightings and field signs from throughout the study area were widespread and regular. All of the Deer Habitat Areas identified showed at least medium-low levels of deer activity, with most areas assessed as supporting medium-high to high activity levels (see Table 2).

Table 2 – Evaluation of Roe Deer Activity

Habitat Areas	Areas of Deer Habitat	Field Signs Encountered	Deer Sighting	Deer Activity Level
Section FL1				
F3	Megray Burn	NO 873 877	No	Medium
F6	Megray Wood	NO 873 889	Yes	Medium-High
F7	Limpet Burn Wood	NO 876 888	Yes	Medium-High
F9	Kempstone Hill	NO 876 895	Yes	Medium
F10	Whitemyres Wood	NO 868 899	Yes	Medium-High
F11	White Hill	NO 865 900	Yes	Medium-High
F12	North Fishermyme	NO 866 902	Yes	High
Section FL2				
F12	South of Allochie	NO 866 908	Yes	Medium-High
F13	North of Allochie	NO 865 916	Yes	Medium
F13	Burnorrachie	NO 876 916	Yes	Medium-Low
F15	Burn of Muchalls, South of Elrick	NO 871 919	Yes	Medium-Low
F16	North of Clayfolds	NO 877 924	Yes	Medium
F19	Harecraig, North East of Cookney	NO 875 936	Yes	Medium
Section FL3				
F17	Backhill	NO 869 935	Yes	Medium
F18	North Cookney	NO 869 936	Yes	Medium
-	Red Moss	NO 860 939	Yes	High
F18	North Rothnick	NO 875 952	Yes	High
F22	East Rothnick	NO 878 959	Yes	Medium-Low
-	Berrytop	NO 857 961	No	Medium
F22	Stranog Hill	NO 865 966	Yes	Medium
-	Burnside Wood	NO 854 976	Yes	Medium-High
-	North of Burnside Wood	NO 853 979	Yes	Medium-High
-	Invercrynock Cottage	NO 860 978	Yes	Medium
-	Polston	NO 861 980	Yes	Medium
Habitat Areas	Areas of Deer Habitat	Field Signs Encountered	Deer Sighting	Deer Activity Level
F27	Blaikiewell	NO 864 981	Yes	Medium
F26	South of Burnhead	NO 874 981	No	Medium-Low
F26	West of Burnhead	NO 873 986	Yes	Medium

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4.1.2 Areas displaying medium-high to high deer activity include: Megray Wood, Limpet Burn Wood, Whitemyres Wood, White Hill, North Fishermyle, South of Allochie, North Rothnick, Burnside Wood, and North of Burnside. These comprise a range of habitats ranging from mature conifer plantation, scattered broadleaved woodland, dense and continuous scrub to dry heath with dense gorse scrub, improved grassland, arable and marshy grassland (refer to Table 3). All areas, although not always continuous swathes of woodland or scrub, provide highly suitable pockets of cover and a variety of foraging opportunities for roe deer.

Table 3 – Habitat Descriptions of Medium-High to High Deer Activity Areas

Habitat Area	Areas of Deer Habitat	Habitat	Area (ha)	Deer Activity Level
F1	Megray Wood	Mature conifer plantation.	40	Medium-high
F1	Limpet Burn Wood	Scattered broadleaved woodland, dense bracken and continuous scrub.	14	Medium-high
F1	Whitemyres Wood	Scrub and heath.	12.5	Medium-high
F1	Whitehill Wood	Broadleaved woodland, coniferous plantation and dense and continuous scrub.	10.5	Medium-high
F1	North Fishermyle	Dry heath with dense gorse and scrub with mixed woodland, marshy grasslands and wet woodland.	5	High
F2	South of Allochie	Dry heath and dense gorse scrub with willow woodland.	52	Medium-high
F3	North Rothnick	Improved grassland and arable with dense scrub.	2	High

4.1.3 Sections FL1 and FL3 have the greatest woodland/continuous scrub density (providing the greatest cover) bordering one or both sides of the proposed route. The result is that these areas have the highest deer activity levels.

4.1.4 Overall, the population of roe deer in the study area is considered to have medium to medium-high activity levels in the vicinity of the proposed route.

5 Risk Assessment

5.1 Human Safety and Economic Risk

5.1.1 The deer population, including roe deer, is increasing in Scotland (Hunt, 2003). This fact, together with increasing traffic volumes and higher traffic speed, increases the potential RTA risk. The introduction of a high-speed road passing through several areas of relatively high deer activity would raise concerns about human safety, economic cost and animal welfare, as well as increasing the risk of accidents.

5.1.2 During the operational phase, there would be a concern over public safety as a consequence of RTA, potentially leading to severe and even fatal injuries to humans.

5.1.3 A review of literature published in the United States and Europe has suggested that between 2% and 5% of deer-related accidents would be expected to result in human injury (Langbein, 2004). In Britain each year it is estimated that several hundred injuries occur, including 15 fatalities as a direct consequence of deer-related RTAs (Langbein, 2004).

5.1.4 Police records of RTAs involving human injury maintained by Aberdeenshire Council do not at present enable separation of past incidents involving deer from those of other animals.

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- 5.1.5 The Fortis Group of Insurers, which currently hold 4% of the entire motor insurance market of private cars in the UK, reported a total of 50 claims in Scotland for the year 1999-2000 pertaining to deer-related traffic accidents. The average for the 50 claims was £1,380 (Staines et al., 2001). Extrapolation from these data suggests that there are some 1250 deer-related RTAs/annum in Scotland (as a whole) and the insurance costs resulting from such collisions are approximately £1.725 million.

5.2 Roe Deer Welfare

- 5.2.1 There is expected to be a low risk to deer during the construction phase, although young fawns might be susceptible to mortality and disturbance whilst still dependent on their mothers.
- 5.2.2 During the operational phase there would be a potential risk of RTAs along the corridor of the whole alignment resulting in deer injury or fatality. A deer welfare issue arises if a deer is injured. Many of the deer involved in RTAs are not killed outright but die later of their injuries (Staines et al., 2001), or may need to be humanely dispatched at the roadside by a qualified person, normally by use of a firearm.
- 5.2.3 Although some areas of woodland did not record high levels of roe deer activity during the ecological field surveys, roe deer distribution range and population numbers are increasing (Hunt, 2003) and may be expected to continue to increase in future years. Consequently, roe deer numbers could increase near towns or built up areas (and near high speed roads) where deer control tends to be more difficult.

5.3 Risk of RTAs

- 5.3.1 The assessed risk of deer-related RTAs and impacts upon deer habitat supporting medium to high activity levels are presented for each area in Table 4. The risk of RTAs is considered to be higher where areas of woodland/scrub would suffer habitat loss and/or fragmentation as a result of the proposed scheme.

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Table 4 – Predicted Risk Assessment for Potential RTA Areas

Habitat Areas	Deer Habitat Area	Impact on Woodland/Scrub habitats		Deer Activity (Med to High)	Potential for Obstructed line of Sight	Magnitude of Risk
		Severance and Fragmentation	Loss of Habitat			
Section FL1						
F3	Megray Burn		*	Medium		Medium Risk
F7	Megray Wood	*	*	Medium-High	*	High Risk
F7	Limpet Burn Wood	*		Medium-High		Medium-High Risk
F9	Kempstone Hill			Medium		Medium-Low Risk
F10	Whitemyres Wood		*	Medium-High		Medium Risk
F11	White Hill			Medium-High		Low Risk
F12	North Fishermyle		*	High		Medium Risk
Section FL2						
F12	South of Allochie		*	Medium-High		Medium Risk
F13	North of Allochie			Medium		Low Risk
F13	Burnorrachie			Medium-Low		Low Risk
F15	Burn of Muchalls, South of Elrick	*	*	Medium-Low		Low Risk
F16	North of Clayfolds			Medium		Medium Risk
F19	Harecraig, North East of Cookney			Medium		Medium Risk
Section FL3						
F17	Backhill			Medium		Low Risk
F18	North Cookney	*	*	Medium		Medium Risk
F18	North Rothnick		*	High		Medium-High Risk
F22	East Rothnick			Medium-Low		Low Risk
F22	Stranog Hill		*	Medium		Low Risk
F27	Blaikiewell			Medium		Low Risk
F26	South of Burnhead			Medium-Low		Medium-Low Risk
F26	West of Burnhead			Medium		Medium-High

* denotes an impact is predicted to occur

- 5.3.2 One area of woodland within the study area, Megray Wood, has a high risk magnitude. Three areas of woodland have been identified as having a medium-high risk magnitude: Limpet Burn Wood (FL1), North Rothnick (FL3), and the wooded strip at West of Burnhead (FL3).
- 5.3.3 Megray Wood would suffer both habitat severance and fragmentation and habitat loss; Limpet Burn Wood would suffer severance and fragmentation. North Rothnick Wood would suffer habitat loss.
- 5.3.4 The proposed scheme would also result in potential for obstructed line of sight in Megray Wood, which would be likely to increase potential RTA risk and consequential human risk.

6 Mitigation and Recommendations

6.1.1 The mitigation recommendations proposed below are those designed to minimise the risk of RTAs on various protected mammals along the proposed scheme, but which will also serve to mitigate for impacts on deer. It is important to emphasise that the proposed mitigation is required, not for the purposes of deer conservation, but rather for the mitigation of impacts on other species. The locations of fencing and overpasses along the proposed route have been designed to correspond with mitigation for other species, specifically badger and otter, as detailed in separate reports (see Appendices A40.2 and A40.5, respectively).

6.1.2 The mitigation measures recommended for use in appropriate locations along the proposed route include:

- roadside fencing for otters and badgers;
- vegetation clearance or management of roadside strips, embankments and cuttings in areas where there is no planting for landscape or ecological purposes; and
- green bridges or wildlife overbridges for protected species.

Roadside Fencing

6.1.3 The proposed fencing strategy in areas for otter/badger mitigation will help to channel animals towards a safe crossing point rather than preventing road-crossings altogether. An otter/badger combination fence will also prevent other animals entering the carriageway. This fence has a mesh size of 75mm x 75mm from ground level to a height of 1m. However, no specific deer fencing is intended as deer that are intent on crossing are likely to continue to attempt and eventually to succeed at breaching the fence, unless some easier (and safer) alternative means of passage to habitat on the opposite side of the carriageway is available.

6.1.4 Putman et al. (2004) also note that continuous fencing, if breached by deer, has a potential to increase the likelihood of RTAs as animals may become trapped on the road. Where significant lengths of fencing are erected..

6.1.5 Deer tend to follow fence lines in order to find the easiest way through or around such barriers. Fences must be positioned in relation to the topography of the land in order to prevent deer from jumping the fencing and as such should:

- not be positioned directly below the slope of a cutting;
- not traverse a slope of a cutting; or
- be erected close to any undulating land.

Maintenance of Fencing

6.1.6 There is the potential for otter/badger fencing to fail or become breached by deer that try to cross the road. To help reduce the possibility of future RTAs, the fence must be checked regularly for damage and repaired as soon as possible. The fence must also be maintained at regular intervals and to a high standard.

Green Bridges or Wildlife Overbridges

6.1.7 Safe alternative crossing points are provided by green bridges or wildlife overbridges (refer to Figures 41a-k). In all cases where crossing points are provided, roadside fencing must be designed to direct protected species towards these points. These will be able to accommodate a vegetated strip of land along at least one side.

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Vegetation Management of Roadside Strips

- 6.1.8 Studies in countries other than the British Isles (Waring et al., 1991, cited in Staines et al., 2001) have shown that high vegetation immediately adjacent to the carriageway potentially increases the risk of a deer-related accident in specific areas by attracting deer closer to the road and impeding the motorists' line of sight. They have also shown that removal of vegetation reduces the level of that risk.
- 6.1.9 Any management of vegetation that does take place should be conducted during the autumn season, as re-growth may attract deer close to the carriageway (Rea, 2003, cited in Putnam et al, 2004).

Deer Management and Monitoring

- 6.1.10 Given that the main concerns are not related to conservation, but human safety and deer welfare , a monitoring scheme should be adopted to ensure that reductions in future RTAs are maintained. If RTAs were frequently observed in a particular area then further mitigation measures could be implemented or improvement to existing measures be addressed.
- 6.1.11 A monitoring scheme should run for at least the first five years of operation although RTAs that occur beyond this time must be logged by the Highways Maintenance agents responsible for clearing animal carcasses from the new road, and reported to the Deer Collisions Project (www.deercollisions.co.uk) whilst it remains on-going.
- 6.1.12 Monitoring of the success of the mitigation measures should be implemented to ensure that a reduction in deer collision risk is maintained for the foreseeable future. As well as ensuring a cost-effective deer management strategy for the proposed scheme, this will provide important information for future road schemes in Scotland. Results from monitoring may facilitate informed judgement to predicting areas that become ineffective or areas that are susceptible to breaching by deer. This will assist in targeting specific requirements accurately and effectively promoting efficient use of resources.

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Annex 1 – Deer Collision Records Supplied by Grampian Police Control and Aberdeenshire County Council Roads Department for 2003 – 2005

Date	Time reported/ collected	Road No.	Location	OSREF	GRIDACC	Species of Deer	Gender	Habitat Wooded/Open	Was The Road Deer Fenced?	Source
08/12/2005		A90		NO874872		Roe		Open		Aberdeenshire
06/11/2005		A90		NO930998		Roe		Open		Aberdeenshire
29/10/2005		B9077		NJ859001		Roe		Wooded		Aberdeenshire
20/10/2005		B979		NO867899		Roe		Wooded		Aberdeenshire
19/10/2005		A93		NJ853012		Roe		Open		Aberdeen City
08/09/2005		A90		NO874872		Roe		Open		Aberdeenshire
10/08/2005		B9077		NJ859001		Roe		Wooded		Aberdeenshire
03/08/2005		A90		NJ931014		Roe		Open		Aberdeen City
07/07/2005		B		NJ932011		Roe		Open		Aberdeen City
31/05/2005				NJ859001		Roe		Wooded		Aberdeenshire
23/05/2005		B979		NJ866900		Roe		Wooded		Aberdeenshire
21/05/2005		A90		NJ933011		Roe		Open		Aberdeen City
05/03/2005		B979		NO866901		Roe		Wooded		Aberdeenshire
06/01/2005		A93		NJ857015		Roe		Wooded		Aberdeen City
06/08/2004		A90		NO931999		Roe		Open		Aberdeenshire
22/06/2004				NJ866084		Roe		Wooded		Aberdeen City
10/06/2004		B9077		NJ859001		Roe		Wooded		Aberdeenshire
24/05/2004		A90		NO865872		Roe		Wooded		Aberdeenshire
05/04/2004		A90		NJ933010		Roe		Open		Aberdeen City
23/02/2004		A94		NO878871		Roe		Open		Aberdeenshire
11/02/2004		Unclass		NJ915000		Roe		Wooded		Aberdeenshire
27/10/2003		A90		NO868874		Roe		Open		Aberdeenshire
19/10/2003				NJ867086		Roe		Open		Aberdeen City
27/05/2003		A90		NJ933003		Roe		Open		Aberdeen City
19/03/2003		B9077		NJ863003		Roe		Wooded		Aberdeenshire
02/01/2003				NO877986		Roe		Open		Aberdeenshire