



Appendix 25.8 – Deer Survey

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Jacobs UK Limited 95 Bothwell Street, Glasgow G2 7HX

Tel 0141 204 2511 Fax 0141 226 3109

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1 Introduction

General Background

- 1.1 This report is concerned with the impacts of the Southern Leg section of the proposed scheme on deer populations. Consideration is also given to collision risk.
- 1.2 To aid the interpretation of the assessment, the Southern Leg has been sub-divided into six component route sections as follows:
- Section SL1: Charleston to Bishopston (ch207200 - 203150);
 - Section SL2: Bishopston to Burnhead (ch203150 - 200600);
 - Section SL3: Burnhead to the A93 (ch200600 - 102870);
 - Section SL4: A93 to Beanshill (ch102870 - 105900);
 - Section SL5: Beanshill to South Kingswells Junction (ch105900 - 108500); and
 - Section SL6: South Kingswells Junction to Derbeth Overhills (ch108500 - 111200).
- 1.3 All tables and figures are structured in this manner.
- 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 (as amended), IEEM (2002) Guidelines for Ecological Impact Assessment along with cognisance of draft Institute of Ecology and Environmental Management (IEEM) guidelines (2006).
- 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.
- 1.6 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

- 1.7 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).
- 1.8 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, and as such, 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.
- 1.9 An assessment of collision risk, drawn from the results of the above, has informed the development of appropriate mitigation measures.

Deer Biology

- 1.10 Of the six species of deer established in the wild in Britain, two are native and four have been introduced.
- 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.
- 1.12 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.
- 1.13 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).
- 1.14 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

- 1.15 Roe deer in Britain are not threatened or declining and as such all legislation pertinent to this species relates to prevention of animal cruelty.
- 1.16 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

- 1.17 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).
- 1.18 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).
- 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);

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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- 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

Previous Survey Information

- 2.1 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.

Deer Assessment Methods

Collation of Incidental Sightings and RTA Records

- 2.2 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.
- 2.3 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.
- 2.4 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 25.11a-h). The incidental records were made whilst conducting animal and plant surveys over a 25 week period between 14 February 2006 and 24 August 2006.
- 2.5 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).

Evaluation of Deer Activity

- 2.6 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.
- 2.7 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.

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- 2.8 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

- 2.9 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.
- 2.10 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.
- 2.11 The risk assessment findings informed identification of appropriate mitigation measures along the proposed scheme to reduce the risk of collision.

3 Baseline

Data search

- 3.1 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.
- 3.2 Consultation was undertaken with Scottish Natural Heritage (SNH), North East Scotland Biological Records Centre (NESBReC) and Dr Jochen Langbein.
- 3.3 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 was made available by Dr Langbein.
- 3.4 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.

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- 3.5 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.
- 3.6 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.

Survey Results

- 3.7 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 Charleston to Derbeth Overhills (Sections SL1 to SL6). Deer sightings were less common in areas of open ground in particular; the area from Nether Beanshill to Gairnhill Wood, e.g. improved grassland, arable fields and upland 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.
- 3.8 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 around the Charleston Junction (eight records), the B9077 around the River Dee crossing (four records), and around the North Deeside Road (two records). All RTAs are presented in Figures 25.1a-25.11h).

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Table 1 – Field Survey Results and RTA Records

Areas of Deer Habitat	OS Grid Reference	Figure No.	Field Signs Encountered	Deer Sighting	Number of RTA Records and Distance from Alignment
Section SL1					
Greenhowe Plantation	NJ 923 000	25.11a	Yes	Yes	8 records along A90 within 800m
Duffs Hill Plantation	NO 920 997	25.11a	Yes	No	
Drumth Whacket	NO 915 999	25.11a	Yes	No	1 record at 250m north
Hare Moss	NO 908 995	25.11b	Yes	Yes	
Section SL2					
Cowford	NO 895 992	25.11b	Yes	Yes	1 record at 800m north
Heatherknowe	NO 895 989	25.11b	Yes	Yes	
West of Greenloaning	NO 886 988	25.11b	Yes	Yes	
Greenloaning	NO 892 991	25.11b	Yes	Yes	
Clochandighter Wood	NO 893 983	25.11b	Yes	Yes	
Merchant's Croft	NO 886 988	25.11b	Yes	Yes	
Hill of Blairs and Craingles Males ²	NO 882 990	25.11c	Yes	Yes	
Areas of Deer Habitat	OS Grid Reference	Figure No.	Field Signs Encountered	Deer Sighting	Number of RTA records and distance from alignment
Whitestone Wood	NO 880 987	25.11c	Yes	Yes	
Craigend	NO 877 991	25.11c	Yes	Yes	
Red Tile Lodge	NO 877 987	25.11c	Yes	Yes	1 record at 25m south
East of Burnhead	NO 878 983	25.11c	Yes	Yes	
Craigentath	NO 877 978	25.11c	Yes	Yes	
Section SL3					
Craingles Wood	NO 873 992	25.11c	Yes	Yes	
Cleanhill Wood	NO 865 992	25.11c	Yes	Yes	
	NO 865 991	25.11c	Yes	Yes	
Durris Forest	NO 863 988	25.11c	Yes	Yes	
Eastland Wood	NO 862 992	25.11c	Yes	No	
	NO 861 992	25.11c	Yes	No	
Storybook Glen	NO 860 994	25.11c	Yes	No	
Kingcausie Wood	NO 862 997	25.11d	Yes	No	4 records on B9077 within 600m
Section SL4					
Old Deeside Line Walk	NJ 857 010	25.11d	Yes	No	1 record on A93 within 200m
Culter House Wood	NJ 845 014	25.11d	Yes	Yes	
Milltimber Wood	NJ 849 018	25.11e	Yes	Yes	1 record within 800m
	NJ 849 017	25.11e	Yes	Yes	
Guttrie Hill	NJ 843 016	25.11e	Yes	Yes	
	NJ 843 018	25.11e	Yes	Yes	
Nether Beanshill	NJ 843 020	25.11e	Yes	No	
	NJ 842 020	25.11e	Yes	Yes	
Stone Circle	NJ 853 021	25.11e	Yes	No	

² Male Roe deer are considered to pose an increased risk of RTAs as rutting behaviour was recorded in this area.

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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
Western Stretch of Stone Circle	NJ 850 021	25.11e	Yes	No	
Beanshill	NJ 846 034	25.11e	Yes	Yes	
Section SL5					
Gairnhill Wood	NJ 850 040	25.11f	Yes	Yes	
	NJ 853 044	25.11f	Yes	Yes	
	NJ 854 045	25.11f	Yes	Yes	
East Brotherfield	NJ 841 042	25.11f	Yes	Yes	
East Silverburn	NJ 848 045	25.11f	Yes	Yes	
	NJ 848 042	25.11f	Yes	No	
South of Moss of Auchlea	NJ 846 051	25.11f	Yes	Yes	
Moss of Auchlea	NJ 848 053	25.11f	Yes	Yes	
Bishops Court	NJ 844 059	25.11f	Yes	Yes	
Section SL6					
Denhead of Cloghill	NJ 855 070	25.11g	Yes	Yes	
Hillhead of Derbeth	NJ 860 086	25.11h	Yes	No	2 records within 500m.

4 Evaluation

4.1 The distribution and frequency of deer sightings and field signs throughout the study area were both 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	Deer Signs Encountered	Deer Sighting	Deer Activity Level
Section SL1				
S6	Greenhowe Plantation	NJ 923 000	Yes	Medium-High
S7	Duff's Hill Plantation	NO 920 997	No	Medium
S9	Drumth Whacket	NO 915 999	No	High
S10	Hare Moss	NO 908 995	Yes	Medium-Low
Section SL2				
S12	Cowford	NO 895 992	Yes	Medium-Low
S11	Heatherknowe	NO 895 989	Yes	Medium-High
S13	West of Greenloaning	NO 886 988	Yes	Medium
S12	Greenloaning	NO 892 991	Yes	Medium-Low
S14	Clochandighter Wood	NO 893 983	Yes	Medium
S16	Merchant's Croft	NO 886 988	Yes	Medium-Low
S15	Hill of Blairs and Craingingles Males ³	NO 882 990	Yes	High
S15	Whitstone Wood	NO 880 987	Yes	Medium-High
S15	Red Tile Lodge	NO 877 987	Yes	Medium-High
S16	East of Burnhead	NO 878 983	Yes	Medium-Low

³ Male Roe deer are considered to pose an increased risk of RTAs as rutting behaviour was recorded in this area.

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Habitat Areas	Areas of Deer Habitat	Deer Signs Encountered	Deer Sighting	Deer Activity Level
Section SL3				
S20	Cleanhill Wood	NO 865 992	Yes	High
S18	Durris Forest	NO 863 988	Yes	Medium-High
S22, S23	Eastland Wood	NO 862 992	No	Medium
S23	Storybook Glen	NO 860 994	No	Medium
S24	Kingcausie	NO 862 997	No	High
Section SL4				
S29	Old Deeside Line Walk	NJ 857 010	No	Low
S32	Culter House Wood	NJ 845 014	Yes	Medium
S35	Milltimber Wood	NJ 849 017	Yes	High
S34	Guttrie Hill	NJ 843 016	Yes	High
S36	Nether Beanshill	NJ 842 020	Yes	Medium
S36	Stone Circle	NJ 853 021	No	Medium
S36	Western Stretch of Stone Circle	NJ 850 021	No	Low
S39	Beanshill	NJ 846 034	Yes	Medium-High
Section SL5				
S43	Gairnhill Wood	NJ 854 045	Yes	High
S40	East Brotherfield	NJ 841 042	Yes	Medium
S42	East Silverburn	NJ 848 045	Yes	High
S44	South of Moss of Auchlea	NJ 848 053	Yes	Medium
S45	Moss of Auchlea	NJ 848 053	Yes	High
S44	Bishops Court	NJ 844 059	Yes	High
Section SL6				
S47	Denhead of Cloghill	NJ 855 070	Yes	Medium

4.2 Areas displaying high deer activity include: Drumth Whacket, Hill of Blairs and Craingles Males, Craingles Wood, Cleanhill Wood, Kingcausie Wood, Milltimber Wood, Guttrie Hill, Gairnhill Wood, East Silverburn, Moss of Auchlea and Bishops Court (see Table 3). These are predominantly areas of conifer, broadleaf and mixed plantation, or scattered and dense scrub with bracken, all of which provide excellent cover and suitable foraging for roe deer.

Table 3 – Habitat Description of High Deer Activity Areas

Sections	Areas of Deer Habitat	Habitat	Area (Ha)	Deer Activity Level
S1	Drumth Whacket	Young conifer plantation	15	High
S2	Hill of Blairs and Craingles Males	Dense bracken and continuous scrub with mature conifer woodland	29	High
S3	Craingles Wood	Mature conifer plantation	100	High
S3	Cleanhill Wood	Mature conifer plantation	63	High
S3	Kingcausie	Mature semi-natural mixed woodland plantation	17	High
S4	Milltimber	Mature conifer plantation	15	High
S4	Guttrie Hill	Mature conifer plantation	8	High
S5	Gairnhill Wood	Mature conifer plantation	70	High
S5	East Silverburn	Improved grassland and semi-improved grassland and marshy grassland	4	High
S5	Moss of Auchlea	Scrub and wet grassland	6	High
S5	Bishop's Court	Improved grassland and arable fields.	4	High

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- 4.3 Sections SL3 and SL5 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.
- 4.4 Overall, the population of roe deer in the study area is considered to have medium-high activity levels in the vicinity of the proposed scheme.

5 Risk Assessment

Human Safety and Economic Risk

- 5.1 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.
- 5.2 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.
- 5.3 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).
- 5.4 Police records of RTAs involving human injury maintained by Aberdeenshire Council, do not at present allow separation of past incidents involving deer from those of other animals.
- 5.5 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.

Roe Deer Welfare

- 5.6 There is expected to be a low risk to deer during the construction phase, although young fawns may be susceptible to mortality and disturbance whilst still dependent on their mothers.
- 5.7 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.
- 5.8 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.

Risk of RTAs

- 5.9 The assessed risk of deer-related RTAs and impact 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

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where areas of woodland/scrub would suffer habitat loss and/or fragmentation as a result of the proposed scheme.

Table 4 – Predicted Risk Assessment for Potential RTA Areas (Sections SL1 – SL6)

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 SL1						
S6	Greenhowe Plantation	*	*	Medium-High		High Risk
S7	Duff's Hill Plantation			Medium		Medium Risk
S9	Drumth Whacket			High		Medium Risk
Section SL2						
S12	Cowford			Medium		Low Risk
S11	Heatherknowe			High		Medium-High Risk
S12	Greenloaning			Medium		Medium-Low Risk
S14	Clochandighter Wood	*	*	Medium		Medium Risk
S16	Merchant's Croft			Medium		Medium Risk
S15	Hill of Blairs and Craingles Males			High		Medium Risk
S15	Whitestone Wood		*	High		Medium Risk
-	Craigend			Medium		Low Risk
S15	Red Tile Lodge			Medium		Medium-High Risk
Section SL3						
-	Craingles Wood	*	*	High		Low Risk
S20	Cleanhill Wood	*	*	High		High Risk
S18	Durris Forest			Medium-High		Low Risk
S22, S23	Eastland Wood			Medium		Medium Risk
S23	Storybook Glen			Medium		Medium-Low Risk
S24	Kingcausie Wood	*	*	High	*	High Risk
Section SL4						
S29	Old Deeside Line Walk			Medium		Medium-Low Risk
S35	Milltimber Wood			High		High Risk
S34	Guthrie Hill			Medium-High		Low-Medium Risk
S39	Beanshill			Medium-High		Medium-High Risk
Section SL5						
S43	Gairnhill Wood			High	*	Medium-High Risk
S40	East Brotherfield			Medium		Low Risk

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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			
S42	East Silverburn			High		Medium-High Risk
S44	South of Moss of Auchlea			Medium		Low Risk
S45	Moss of Auchlea	*		High		Medium-High Risk
S44	Bishop's Court			High		Low Risk
Section SL6						
S47	Denhead of Cloghill	*	*	Medium		Medium-High Risk
-	Hillhead of Derbeth			Medium		Medium Risk

* denotes an impact is predicted to occur

5.10 Four areas of woodland within the study area were identified as having a high risk magnitude: Greenhowe Plantation (SL1), Cleanhill Wood (SL3), Kingcausie Wood (SL3) and Milltimber Wood (SL4).

5.11 Each of these woodland habitats (with the exception of Milltimber Wood) would be affected by habitat severance, fragmentation and habitat loss. The proposed scheme would result in potential for obstructed line of sight in Kingcausie Wood, which would be likely to increase RTA risk and consequential human risk.

6 Mitigation

6.1 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 would be 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 A25.2 and A25.5, respectively).

6.2 The mitigation measures recommended for use in appropriate locations along the proposed scheme 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

6.3 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.

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- 6.4 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.
- 6.5 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; nor
 - be erected close to any undulating land.

Maintenance of Fencing

- 6.6 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

- 6.7 Safe alternative crossing points may be provided by green bridges or wildlife overbridges (refer to Figures 26.5a-p). 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.

Vegetation Management of Roadside Strips

- 6.8 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. However, it is not suggested that large-scale removal and suppression of vegetation is an effective mitigation measure (Staines et al., 2001; Putnam et al., 2004).
- 6.9 Any management of vegetation that does take place will 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

- 6.10 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.
- 6.11 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.
- 6.12 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.

7 References

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Annex 1 – Deer Collision Records Supplied by Grampian Police Control and Aberdeenshire County Council Roads Department for 2003 - 2004

Date	Time reported/collected	Road No.	Location	OSREF	GRIDACC	Species of Deer	Gender	Habitat Wooded/Open	Was The Road Deer Fenced?	Source
22/11/2004	2.00pm	B9077	Ardoe Hall South Deeside Road	NJ901020	2km	Roe	M	Open	No	SouthAberdeenshire Council
04/11/2004	1.35pm	B977	Parkhill Road	NJ908144	2KM	Roe	F	Wooded	No	CentralAberdeenshire Council
02/11/2004	11.30am	Unclass	Banchory/Devenick Area	NJ909015	2KM	Roe	F	Open	No	SouthAberdeenshire Council
11/10/2004	9.35am	B977	Parkhill to Dyce	NJ902147	2KM	Roe	F	Wooded	No	CentralAberdeenshire Council
09/09/2004	10.25am	B9077	Maidenfold Ardoe	NJ899020	2km	Roe	M	Wooded	No	SouthAberdeenshire Council
21/07/2004	2.15pm	B999	Potterton	NJ939154	2KM	Roe	F	Open	No	CentralAberdeenshire Council
06/07/2004	13:34	A96	A96 roundabout - Airport	NJ879106						Grampian Police control
28/06/2004	1.00pm	B9077	Ardoe House, Banchory Devenick	NJ901021	2km	Roe	M	Wooded	No	SouthAberdeenshire Council
22/06/2004	16:50		Kingswells - Bucksburn	NJ866084	2km					Grampian Police control
11/06/2004	2pm	B977	Parkhill	NJ909153	2KM	Roe	F	Open	No	CentralAberdeenshire Council
11/06/2004	2.45pm	B999	Potterton	NJ939149	2KM	Roe	M	Open	No	CentralAberdeenshire Council
08/06/2004	9.30am	A90	At the Aberdeen Boundary	NO931999	2KM	Roe	M	Open	No	SouthAberdeenshire Council
28/05/2004	23:09		Drum Castle	NJ 803004	2km					Grampian Police control
25/05/2004	7.30am	B9077	Ardoe South Deeside road	NJ902021	2km	Roe	F	Wooded	No	SouthAberdeenshire Council
11/05/2004	2.00pm	B977	Parkhill	NJ908151	2KM	Roe	F	Open	No	CentralAberdeenshire Council
11/05/2004	2.45pm	B999	Potterton	NJ939152	2KM	Roe	M	Open	No	CentralAberdeenshire Council
14/04/2004	10am	B9077	Blairs Colledge South Deeside Rd	NJ884012	1KM	Roe	F	Wooded	No	SouthAberdeenshire Council
30/03/2004	00:12	B999	B999 Newmachar turn off	NJ917189	1km					Grampian Police control
26/02/2004	11-30am	B9077	Blairs	NJ883012	1KM	Roe	F	Wooded	No	SouthAberdeenshire Council
09/02/2004	20:31		Drum Castle Drumoak	NJ803004	3km					Grampian Police control
08/02/2004	00:30		Mugiemoss Road Bucksburn	NJ887093	2km					Grampian Police control
13/01/2004	14:02		Whitestripes Road, Aberdeen	NJ908041	1km					Grampian Police control
30/12/2003	18:24		Skene Road Aberdeen	NJ890061						Grampian Police control
27/12/2003	11-30am	B9077	Tilbourie Blairs	NJ863003	4km	Roe	F	Open	no	SouthAberdeenshire Council
23/12/2003	10am	B9077	half mile east of Blairs	NJ893015	1km	Roe	F	Wooded	no	SouthAberdeenshire Council
10/12/2003	2-30pm	B9077	half mile west of Maryculter house	NO841988		Roe	F	Wooded	no	SouthAberdeenshire Council

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Date	Time reported/collected	Road No.	Location	OSREF	GRIDACC	Species of Deer	Gender	Habitat Wooded/Open	Was The Road Deer Fenced?	Source
28/11/2003	4pm	B9077	Half mile West of Blairs College	NJ885014		Roe	F	Wooded	No	SouthAberdeenshire Council
27/11/2003	11am	unclass	Dykeneuk Blairs	NJ884007		Roe	F	Open	No	SouthAberdeenshire Council
20/11/2003	8-30am	A93	Coalford Drumoak	NJ808002		Roe	F	Wooded	No	SouthAberdeenshire Council
12/11/2003	11am	B9077	Ardoe House South Deeside Rd	NJ898017		Roe	M	Wooded	No	SouthAberdeenshire Council
11/11/2003	11am	B979	Burnside Netherley	NO850972		Roe	F	Open	No	SouthAberdeenshire Council
07/11/2003	11-15am	unclass	Banchory /Devenick to Maryculter	NO900998	10	Roe	M	Wooded	no	SouthAberdeenshire Council
04/11/2003	3pm	B9077	Craiglug Durriss	NO815979		Roe	F	Wooded	No	SouthAberdeenshire Council
31/10/2003	11.00am	?	Hillhead, Kintore	NJ799164	10	Roe	M	Wooded	No	CentralAberdeenshire Council
30/10/2003	8am	B9077	Ardoe old police station	NJ892016		Roe	M	Wooded	no	SouthAberdeenshire Council
25/10/2003	00:21		Wellheads Drive Dyce	NJ883110	2KM					Grampian Police control
19/10/2003	05:04		Bucksburn - Kingswells	NJ867086	2km					Grampian Police control
14/10/2003	10am	B9077	Ardoe old police station	NJ892016		Roe	F	Wooded	no	SouthAberdeenshire Council
19/09/2003	7.30am	A93	Newmill Peterculter	NJ826012		Roe	F	open	No	SouthAberdeenshire Council
19/09/2003	7.32am	A93	Newmill Peterculter	NJ826012		Roe	F	Open	no	SouthAberdeenshire Council
17/09/2003	02:38		Balgownie Drive Bridge of Don	NJ931097						Grampian Police control
17/09/2003	a.m.	B997	Parkhill Cross Roads to Aberdeen	NJ889145		Roe	M	Wooded	No	CentralAberdeenshire Council
16/09/2003	a.m.	B979	Blackburn to Wogel Road	NJ825120	10	Roe	M	Wooded	No	CentralAberdeenshire Council
05/09/2003	00:39		Eigie Road Balmedie	NJ968177	1km					Grampian Police control
01/09/2003	11.15	B9077	One mile east of Durriss Bridge	NO807978		Roe	F	Wooded	No	SouthAberdeenshire Council
26/08/2003	p.m.		Blackburn to Westhill Road	NJ825126	10	Roe	F	Wooded	No	CentralAberdeenshire Council
21/08/2003	7-30am	B9077	Half mile from Blairs Colledge	NJ885114		Roe	M	Open	No	SouthAberdeenshire Council
19/08/2003	1-30pm	A90	Cammachmore Southbound	NO909949		Roe	M	Open	No	SouthAberdeenshire Council
05/08/2003	a.m.	B977	Parkhill	NJ900149	10	Roe	M	Wooded	No	CentralAberdeenshire Council
31/07/2003	10.00am	B977	Parkhill	NJ900149	10	Roe	F	Wooded	No	CentralAberdeenshire Council
19/06/2003	11.00am	B9077	Park Quarry	NO807978		Roe	M	Wooded	No	SouthAberdeenshire Council
18/06/2003	06:59		Old Skene Road Kingswells	NJ81500715	3km					Grampian Police control
18/06/2003	a.m.	B993	Kinmuck - Fintry Road	NJ8319	10	Roe	M	Open	No	CentralAberdeenshire Council
27/05/2003		B977	BALBITHER TO FINTRY NO.1	NJ805162	1			WOODED		CentralAberdeenshire Council

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Date	Time reported/collected	Road No.	Location	OSREF	GRIDACC	Species of Deer	Gender	Habitat Wooded/Open	Was The Road Deer Fenced?	Source
27/05/2003		B977	BALBITHER TO FINTRY NO.2	NJ805162	1			WOODED		CentralAberdeenshire Council
23/05/2003		B977	BROOMHILL KINTORE	NJ817165	10			WOODED		CentralAberdeenshire Council
20/05/2003		A90	BALMDIE	NJ965185	1			GRASS		CentralAberdeenshire Council
14/04/2003		B900	DYCE TO POTTERTON ROAD	NJ920160	10			WOODED		CentralAberdeenshire Council
11/04/2003	22:00		Parkhill - Aberdeen	NJ908145	2km					Grampian Police control
19/03/2003		B9077	MILLBANK	NJ863003				WOODED		CentralAberdeenshire Council
01/02/2003	22:15		Countesswells Road	NJ888043	1km					Grampian Police control
	January-03	A93	Drum Castle	NJ805000		Roe		Wooded		SouthAberdeenshire Council
	May03		Ardoe House, South Deeside Road	NJ898017		Roe		Wooded		SouthAberdeenshire Council
	May03	B9077	Denside, Durriss, South Deeside Road	NO804974		Roe		Wooded		SouthAberdeenshire Council
	April03	B9077	Park Junction, South Deesdie Road	NO804975		Roe		Wooded		SouthAberdeenshire Council
	May03	B979	Parkhead, Maryculter	NO853994		Roe		Wooded		SouthAberdeenshire Council
	Feb03		Blairs to Auchenblae Road at Marycutler	NO877986		Roe		Wooded		SouthAberdeenshire Council
	April03	A90	Bourtrees Junction Northbound	NO909958		Roe		Grassed		SouthAberdeenshire Council