

ANNEX 10

SPECIAL STUDY

DRUMOCHTER HILLS SPA

Drumochter Hills SPA Merlin Special Study

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1.1 Drumochter Hills SPA – Merlin Special Study

1.1.1 Introduction

Scope of Study

- 1.1.1.1 A Special Study was presented in the Environmental Statement (ES)(see Technical Annex 22.11, published September 2005) to assess the effects of the construction, operation and dismantling phases of the proposed Beaulieu to Denny 400kV overhead transmission line and dismantling of the existing 132kV overhead transmission line on merlin (*Falco columbarius*). This study specifically addresses potential impacts on merlin as a qualifying interest of the Drumochter Hills Special Protection Area (SPA).
- 1.1.1.2 Following comments on the ES submitted by Scottish Natural Heritage (SNH) and Royal Society for the Protection of Birds (RSPB) this Special Study has been reviewed and updated (including analysis of additional survey data from that was collected subsequent to the submission of the original ES and Addendum). This report presents the findings of the additional work.
- 1.1.1.3 No potential impacts from the proposed project on dotterel (*Charadrius morinellus*), the only other qualifying interest for the SPA, have been predicted. This is due to their montane habitat requirements, resulting in no spatial overlap of their breeding habitat with the proposed project. No sightings of dotterel were made during flight activity surveys for the proposed 400kV transmission line in 2004, 2005 or 2006. Therefore there are no impacts predicted for this species and consequently an impact assessment is not required.
- 1.1.1.4 In their written response to the ES (letter to the Energy Consents Manager, Scottish Executive, dated 28/02/2006), SNH included specific comments with regard to the summer flight activity survey undertaken in 2004 as part of the merlin Special Study for the Drumochter Hills SPA.
- 1.1.1.5 SNH's comments specific to the merlin Special Study are summarised as follows:
- the summer flight activity survey intensity for merlin in 2004 was considered too low;
 - merlin are very difficult to observe in the field and SNH consider that beyond 500m to 750m merlin often go undetected at VP watches. As the VPs in 2004 were on average approximately 2km apart SNH, expressed concern that merlin activity had been missed; and
 - in relation to the collision modelling work, concern was expressed that the figures for flights per hour had been underestimated.
- 1.1.1.6 SNH concluded that, in its view, it was not possible for it to determine that there was no adverse effect on the integrity of the Drumochter Hills SPA.
- 1.1.1.7 In response to the comments from SNH, further summer flight activity surveys were undertaken in 2005 and 2006 within the existing and proposed transmission line corridor through the Drumochter Hills SPA.
- 1.1.1.8 The methods undertaken and results arising out of this survey work are presented in this special study report. Also included is an estimate of the collision mortality risk for the 400kV line based on the methods described in the Bird Collision Estimation Methods paper and uses the survey data for 2004, 2005 and 2006.
- 1.1.1.9 An estimation of the collision risk for the existing 132kV power line has also been determined and this has been taken into account in the assessment of the potential collision mortality impact of the project overall.
- 1.1.1.10 Taking into account the above information, an assessment of the likely effect on merlin as a qualifying species of the SPA is carried out, in order to determine whether the project is likely to have an adverse effect on the integrity of the SPA.

Legislative Context

- 1.1.1.11 The Habitats Directive¹ and the Birds Directive² have been implemented in Great Britain through The Conservation (Natural Habitats, &c.) Regulations 1994 (hereinafter referred to as “the 1994 Regulations”). The Birds Directive was adopted in response to the 1979 Bern Convention on the conservation of European habitats and species. The Bern Convention was a response to the alarming declines in many populations of wild birds within Europe documented in the 1960s and 70s. The need for cooperation between countries was, and is, seen as vital due to the trans-national migrations of many of these threatened species, which greatly limits the effectiveness of unilateral conservation measures by individual States. In terms of the Birds Directive there is an obligation imposed upon the UK Government under Article 4 to create protected areas in respect of which species listed on Annex I of the Directive are the subject of special conservation measures. Sites so classified are referred to as Special Protection Areas and are referred to in the 1994 Regulations, collectively with Special Areas of Conservation designated under the Habitats Directive, as European Sites (or Natura 2000 sites). In addition, Member States are obliged under Article 4.2 to take similar measures for the protection of regularly occurring migratory species not listed on Annex I but which require protection having regard to a range of factors. On that basis Member States must have particular regard to the protection of wetlands used by such migratory species. Protection of SPA interests is achieved through a number of measures specified in Article 4 of the Birds Directive. In terms of Article 4.4 of the Birds Directive there is an obligation on Member States to ensure that appropriate steps are taken to avoid pollution or deterioration of habitats or any disturbances affecting the birds in so far as these would be significant having regard to the objectives of Article 4.
- 1.1.1.12 As regards the control of development, the obligation under Article 4.4 is fulfilled by the UK Government by the imposition of a statutory duty under Regulation 48 of the 1994 Regulations. In effect the 1994 Regulations require that the competent authority determine whether all proposals (including development projects) have the potential to have a likely significant effect on a European Site (either alone or in combination with other plans or projects) before granting consent or any other authorisation. Those plans or projects which are likely to affect significantly an SPA (and which are not directly connected with or necessary to the management of the site) are restricted by the imposition of a duty on the competent authority not to consent to projects that would have an adverse effect on the integrity of the site, unless there are imperative reasons of overriding public interest for the development undertaken. Detailed advice and guidance on the provisions of the 1994 Regulations is provided in Annex E of the Scottish Executive Circular on the Habitats and Birds Directive, dated June 2000 which updates Scottish Office Circular No. 6/1995 (hereinafter referred to as “the Circular on the Habitats and Birds Directives”).
- 1.1.1.13 Under Regulation 48(1) of the 1994 Regulations any proposal that is likely to have a significant effect on a SPA (either alone or in combination with other plans or projects) requires the ‘competent authority’ (in this case the Scottish Ministers), before deciding to undertake or give any consent, permission or other authorisation for a plan or project, to make an ‘appropriate assessment’ of the implications for the site in view of its ‘conservation objectives’. The competent authority must determine whether the proposal (taking into consideration the way in which it is carried out/ implemented) would have an adverse impact on the integrity of the SPA.
- 1.1.1.14 SNH has requested additional information for Drumochter Hills SPA in order to provide advice to Scottish Ministers as to whether there is a likely significant effect on the SPA and the implications of the predicted impacts on the site’s conservation objectives. The purpose of this updated Special Study is to provide data and an accompanying assessment to assist the competent authority in its assessment as to whether or not the project will be likely to adversely affect the integrity of the SPA.

¹ Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora

² Council Directive 79/409/EEC on the conservation of wild birds

1.1.2 Designation of SPA and Conservation Objectives

1.1.2.1 The Drumochter Hills site qualifies as an SPA under Article 4.1 of the Birds Directive by virtue of the fact that it supports populations of the following species of European importance, listed in Annex I of the Directive:

- Merlin - 7 pairs³ representing at least 0.5% of the breeding population in Great Britain (count as at mid 1990s); and
- Dotterel - 70 pairs representing at least 8.3% of the breeding population in Great Britain (count as at mid 1990s).

1.1.2.2 The following conservation objectives apply to the Drumochter Hills SPA:

- To avoid deterioration of the habitats of qualifying species (merlin, dotterel), or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained.
- To ensure for the qualifying species that the following are maintained in the long term:
 - population of the species as a viable component of the site;
 - distribution of the species within the site;
 - distribution and extent of habitats supporting the species;
 - structure, function and supporting processes of habitats supporting the species; and
 - no significant disturbance of the species.

1.1.3 Description of SPA

1.1.3.1 The Drumochter Hills are located either side of the Drumochter Pass in the central Highlands of Scotland. On the western side of the Pass the SPA extends from Dalnaspidal in the south to Balsporran Cottages in the north and westwards to the banks of Loch Ericht, and on the east side from Dalnaspidal to Dalwhinnie and eastwards to the summits around Cam a' Choire. The hills consist of gently rounded summits, generally between 900-950m, though the full altitudinal range of the area is 360-1010m. The hills are divided by steep-sided gullies and the Pass of Drumochter. The Drumochter Hills are also designated as a SAC due to the presence of European dry heaths, alpine and boreal heaths, sub-Arctic *Salix* spp. scrub, siliceous alpine and boreal grasslands and blanket bogs.

1.1.4 Summary of Proposed Project

1.1.4.1 The route of the proposed overhead transmission line follows the existing infrastructure corridor through the Drumochter Pass containing the A9 road, railway line and the existing 132kV overhead transmission line. The proposed route of the 400kV line runs approximately parallel to the existing 132kV transmission line and crosses the SPA for approximately 6.4km between North Drumochter Lodge and Dalnaspidal. The existing 132kV line crosses approximately 2.1km of the SPA, (see Figure 22.11 of the Technical Annex of the ES) as several sections are just outside of the SPA boundary, that runs to the east of the A9.

1.1.4.2 Drawings A3/PTD/6054/255 and A3/PTD/6054/256 (presented in the Addendum to the ES) show the routes within the Drumochter SPA of the proposed 400kV overhead transmission line and also the 132kV line which as part of the project, is to be dismantled. Section 22.16 of the Technical Annex of the ES provides a method statement prepared by Balfour Beatty Power Networks which details the proposed works within the Drumochter Hills SPA.

1.1.5 Merlin Ecology

Introduction

1.1.5.1 The merlin is a small falcon (wing span 50-62cm, body size 25-30cm) which breeds on moorland, notably in the Scottish Highlands and islands, the Welsh mountains, the Pennines

³ Data from SPA citation (JNCC website v 05/05/06).

and the southern uplands (Gilbert *et al.* 1998, Cramp 1980) and winters on lower ground or coasts. In the Scottish Highlands, the merlin is more abundant on drier, more easterly hills, and is much more thinly dispersed in the Western Highlands, possibly due to poorer land productivity in the wetter and colder west.

- 1.1.5.2 In the UK, merlin nest at low density in open habitat: (5-10 pairs per 100km²), either on the ground with nests concealed in deep heather, or in old crow's nests near to the edge of conifer plantations (Bibby 1986, Newton *et al.* 1986, Rebecca & Cosnette 2003), and feeding on neighbouring open ground (Gibbons *et al.* 1993). Although heather grows on ground above 700m altitude climatic factors tend to inhibit growth. The resulting depth of cover thereby precludes use of these areas by nesting merlin. Territories are traditional, and are used repeatedly from year to year by successive generations of birds, although the exact location of the nest does vary (Rebecca & Cosnette 2003, Marsden *et al.* 2003) and can change by up to several hundred metres (Cramp 1980). The nest is a shallow scrape on the ground, lined with small twigs, pieces of heather, bracken and other material. Eggs are laid in late April or May (Rebecca & Bainbridge 1998, Fielding and Haworth 2003). Incubation is for 28-32 days. The female stays close to the nest, and is responsible for most of the nest defence, and nearly all parental care. The male provides all food from before egg-laying until after the young fledge. Young in a ground nest will often leave the nest at 18-20 days and scatter into the surrounding undergrowth. They fledge at 25-32 days, and are independent about a month later. One brood a year is raised. Replacement clutches are laid after early egg loss. Burning of heather may terminate a long series of nesting attempts but the site may be reoccupied when new cover is sufficiently grown.
- 1.1.5.3 Merlin require extensive open ground for hunting and take a wide range of small birds (Bibby 1987). Their main prey species are meadow pipit (*Anthus pratensis*) and skylark (*Alauda arvensis*). The merlin hunts by perching in an elevated position to locate their prey, usually on rocks or tree stumps. Once prey is sighted, it is usually caught after a short distance surprise attack following a low flight from a perch. Other hunting techniques include prolonged persistent chasing and vertical stooping. A mated pair frequently hunt co-operatively. Prey is usually caught in the air, close to or on the ground.
- 1.1.5.4 Little is known about the hunting distance of breeding merlin (Cramp 1980). Birds tracked by radio telemetry hunted at least 4km from the nest in Wales (Rebecca *et al.* 1990) and foraging flights of six breeding males averaged from 3-5km in an Alaskan study (Schempf 1989). Home ranges of three breeding males in a Montana study were 13, 23 and 28km², each bird travelling up to 9km away from its nest. In the Grampians, mean minimum distance flown by merlin to hunt ringed lapwing (*Vanellus vanellus*) chicks was 3.4 +/- 1.1km, with a range of 2.0 to 5.6km (Rebecca *et al.* 1990).

Population Trends & Conservation Status

- 1.1.5.5 In the UK, widespread declines in the merlin population since the late 19th century are thought to have been caused by human persecution, habitat loss and increased disturbance. From the 1950s the merlin was badly affected by organochlorine pesticides, resulting in an all-time population low by 1960 of about 550 pairs. Population recovery has been slow, and has been hampered by habitat loss, primarily due to forestation and overgrazing (e.g. Rebecca & Cosnette 2003). Loss of moorland habitat is still a major threat. Sympathetic management of heather moorland and adjacent low intensity agricultural land, and sympathetic management of forests in areas where the birds nest, is critical to ensuring the survival of the species.
- 1.1.5.6 Merlin has shown indications of a doubling of population size between the national surveys of 1983/4 and 1993/4 (Rebecca & Bainbridge 1998), which may be associated with an increased use of forest edge as a nesting habitat (Parr 1994). In some areas it is also thought that spring weather conditions could have played a part in this population recovery. In a 2003 study of historical data for a site where no major habitat changes had taken place, Fielding & Haworth (2003) found that the numbers of occupied sites, successful sites and total clutch size were positively correlated with the degree-days⁴. Furthermore, the mean number of young fledged was negatively correlated with the maximum temperature for the period immediately after the

⁴ 'Degree-days' – a measure of accumulated temperature above a developmental threshold; degree days quantify the amount by which daily temperatures exceed this threshold. e.g. If the temperature remained 1° above the lower developmental threshold for 24 hours, one degree-day is accumulated.

mean laying date and with the amount of rainfall when nestlings were present (Fielding & Haworth 2003). Poor spring weather could effect birds either directly, by preventing birds from reaching peak breeding condition (Meek 1988), or indirectly by affecting the amount and availability of food (plants and insects, Fielding & Haworth 2003; passerines, Ratcliffe 1990).

- 1.1.5.7 Population size in the UK is currently c. 1300 pairs \pm 200 pairs (Rebecca & Bainbridge 1998). Consequently the species has recently been removed from the UK Red List of Birds of Conservation Concern but is still listed on the Amber List on the basis of its historical population decline in the UK during 1800-1995 (Gregory *et al.* 2002). National merlin surveys were carried out in 1983-84 (Bibby & Nattrass 1986) and 1993-94 (Rebecca & Bainbridge 1998).
- 1.1.5.8 Merlin are afforded additional legal protection as a species listed on Schedule 1 to the Wildlife and Countryside Act 1981 and are subject to special conservation measures as a species listed in Annex I of the EC Wild Birds Directive 1979 (79/409/EEC).

1.1.6 Assessment Methods

1.1.6.1 The ES for the Beaulieu to Denny 400kV transmission line was informed by the following:

- desk study;
- species-specific survey for merlin;
- moorland breeding bird survey;
- summer flight activity survey; and
- information from SNH commissioned merlin survey.

1.1.6.2 As a result of consultation prior to publication of the ES and the response from SNH to the ES,) further summer flight activity surveys were undertaken in 2005 and 2006. A breeding bird survey was also undertaken in 2005 along the entire length of the transmission line, including the Drumochter Hills SPA. Further detail on the surveys undertaken, and the methods, employed is given below.

Desk Study

1.1.6.3 Various organisations and local experts, including RSPB, SNH, Cairngorm National Park Local Biodiversity Action Plan (LBAP) Officer and the Highland Raptor Study Group, were consulted during the course of the desk study (and during the subsequent stages where necessary), in order to collate existing information on the historical use by merlin of the area either side of the proposed 400kV overhead transmission line. The area considered during the desk study extended to 5km either side of the proposed line. A full list of the organisations consulted, and an indication of the information provided is listed in Technical Annex 22.18 to the ES.

Species-Specific Survey for Merlin

1.1.6.4 The methodology for species-specific surveys for merlin adopted for this study is that which is described in Bird Monitoring Methods (Gilbert *et al.* 1998). Areas of suitability for breeding merlin were initially identified in April 2004 using a study corridor of 1km in width for all sections of the proposed 400kV transmission line route, which were either within the SPA or routed adjacent to the boundary of the SPA. This 1km study corridor was used as a minimum study area for all future survey efforts and in this report will hereinafter be referred to as 'the study area'.

1.1.6.5 Identification of suitable breeding areas included defining the following: moorland with old, deep heather; moorland with rocky outcrops; and moorland with old crows nests in plantations (up to 100m from edges and rides) or scattered trees. For all areas confirmed as potentially suitable, three survey visits were then undertaken between May and July 2004 (inclusive). So as to ensure that no birds were disturbed, all potential areas were scanned using binoculars and telescopes to confirm occupancy by merlin. The species-specific survey for merlin involved a total of approximately 48 hours survey time.

Moorland Breeding Bird Survey

- 1.1.6.6 In addition to the species-specific survey, adapted moorland breeding bird survey (Brown & Shepherd 1993) was completed in order to provide additional information regarding the location of breeding sites and use of the study area by flighting merlin and merlin prey species. Survey was undertaken in 2004 (a single visit with a survey corridor 500m either side of the proposed 400kV line) and in 2005 (two visits with a survey corridor 500m either side of the proposed 400kV line and the existing 132kV line).
- 1.1.6.7 All habitats within the study area were surveyed by systematically walking the survey area so that all parts were visible to a distance not greater than 100m from the surveyor. In order to ensure survey effort was constant, the study area was divided into 500m x 500m quadrats. Each quadrat was surveyed for 20-25 minutes. Where potential breeding sites for raptors (e.g. crags, wooded gorges) were encountered, the surveying intensity was increased to ensure detailed scanning of potential nesting sites.
- 1.1.6.8 All species encountered were mapped on a 1:10 000 field map for each visit. No surveying was undertaken in adverse weather conditions, e.g. windy, precipitation, low cloud, etc.
- 1.1.6.9 Recording methodology followed the standard Common Birds Census (Marchant 1983), including field registration and behaviour codes.
- 1.1.6.10 Detailed analysis of field maps were undertaken in order to produce final distribution maps of breeding birds throughout the study area. The following criteria were used to establish which birds were actually breeding:
- 1.1.6.11 For all birds:
- presence of nest, eggs and/or chicks
 - alarm calling indicative of nest, young or territory
 - displaying or song-flighting
 - distraction display
 - birds aggressively defending territories
 - birds are seen carrying food to nest or young
- 1.1.6.12 For divers and ducks:
- birds showing secretive behaviour
 - presence of pairs, lone males, small groups of males chasing females (ducks only)
- 1.1.6.13 For all raptors:
- if a pair are apparently holding a territory (e.g. alarm calling etc. as listed above)
- 1.1.6.14 For grouse and ptarmigan:
- if a pair were recorded
 - males in song flight
 - males in territorial behaviour
- 1.1.6.15 For all gulls:
- numbers of pairs were counted
- 1.1.6.16 For all passerines:
- birds singing or alarm calling.
- 1.1.6.17 All flights of merlin seen during the course of the breeding bird survey were recorded according to the methods for Summer Flight Activity Surveys (see below).

SNH Merlin Survey

- 1.1.6.18 In addition to the transmission line route corridor survey for merlin undertaken on behalf of the project applicants during April - July 2004, SNH were also undertaking a merlin survey of the entire SPA (between April and August 2004) as part of site condition monitoring. The results of this study, involving approximately 115 hours survey time, have been incorporated within this Special Study to ensure that the baseline dataset is as comprehensive as possible. The SNH survey work included recording the occurrence of all merlin flights, although details of flight height, duration and direction of flight lines were not recorded.

Summer Flight Activity Survey

- 1.1.6.19 Summer flight activity surveys have been undertaken to record merlin activity within the study area in 2004, 2005 and 2006. Detailed flight observations were carried out from suitable vantage points (VPs), providing optimum viewsheds along the route of the proposed 400kV overhead transmission line. During 2004 and 2005 the study involved surveying from six VPs along the route of the proposed transmission line. In general a total of two 3-hour watches for each VP were undertaken per month. In 2004 the survey period extended from April to July and in 2005 the survey period was from April to September. Table 1 gives the total hours watched from each VP in 2004 and 2005.
- 1.1.6.20 During 2004 and 2005 each VP allowed the observation of approximately a 2km corridor length and 1km width. Visibility plans (i.e. viewsheds), showing the area visible at 27.5m above ground level (representing the mid-point of average tower height), for VPs undertaken in 2004 and 2005 are given in the ES and addendum respectively.
- 1.1.6.21 In response to comments from SNH on the ES, in 2006 12 VPs were established along the route of the proposed transmission line. The 12 VPs were located approximately 1km apart to ensure more complete coverage of the proposed route and to reduce the risk of significant flight activity by merlin not being sampled. Visibility plans for the 2006 survey, showing the area visible at 27.5m above ground level (representing the mid-point of average tower height) and at 1km distance are given in Figure 10.1. In April two 3-hour watches were undertaken from each VP and from May three 3-hour watches were undertaken from each VP. Table 1 gives the total hours watched from each VP in 2006 from April to July. Survey data relating to August and September has also been collated but does not form part of this report. Detailed analysis of the August and September data has not been completed, but from preliminary assessment⁵ it does not appear that the data will result in changes to the assessment presented in this Special Study. This assessment has considered, based on the April to July data, the main activity periods for merlin i.e. pre-nest building, nest building, incubation, fledging and part of the post-fledging period.
- 1.1.6.22 Merlin flight activity surveys involved day watches, reflecting the major activity period for merlin. VP surveys were undertaken in varying weather conditions, only being finished early where extreme weather conditions or poor visibility prevented data collection. Each watch lasted 3 hours, unless inclement weather prevented completion of the watch.
- 1.1.6.23 A 180 degree field of view was monitored from each VP. VP locations were therefore chosen to ensure that the maximum extent of the length of the proposed transmission line fell within the surveyor's view. During each VP watch, the area in view was scanned constantly using binoculars and telescope until a target species was detected in flight. Target species included other species, but merlin were followed in flight in preference to all other species that may have been simultaneously in view.
- 1.1.6.24 Once detected, the bird or flock was followed until it ceased flying or was lost to view. The time at which the bird or flock was first detected and duration of the flight, while in sight, were recorded on standardised recording forms (NB a mean height was estimated for flocks). The route followed by the bird or flock was plotted onto a relevant scale of map (no smaller than 1:25 000), in the field. The bird's flying height was estimated at the time of detection and at 15 second intervals until lost from view.

⁵ Five additional flights were recorded, of these the same two crossed the route of the proposed 400kV line and the existing 132kV line (both at risk height).

- 1.1.6.25 The height categories recorded in the 2004 and 2005 surveys were:
- <5m;
 - 5-60m; or
 - >60m.
- 1.1.6.26 The above flight height categories reflect the average height of towers and conductors for the proposed 400kV line. The majority of tower heights will be between 45 and 60m (with the earth wire height at mid span being at least several metres lower than the towers), however, a small number of towers will be up to 65m in height, again with the earth wire several metres lower. The conductor wires, mid span, are a minimum of 7.6m above ground level.
- 1.1.6.27 In order to provide a more comprehensive assessment of the pattern of flight activity in relation to the existing 132kV line a refinement of the height categories recorded was used for the summer flight activity surveys in 2006 as follows:
- <5m;
 - 5-35m;
 - 35-65m; or
 - >65m.
- 1.1.6.28 The refinement of the upper height category reflects the fact that some towers on the proposed 400kV line will be up to 65m in height. Splitting the middle height category into two categories has been completed for the additional assessment of the 132kV transmission line. The maximum tower height of the existing 132kV line is 35m. Therefore, with respect to the proposed 400kV line the collision height categories for 2006 are both 5-35m and 35-65m, which is approximately equivalent to the 5-60m height category recorded in 2004 and 2005. With respect to the 132kV line the collision height category recorded in 2006 is 5-35m.
- 1.1.6.29 For 2004 and 2005 the assessment of the collision risk in relation to the 132kV transmission line is based on a percentage of flights recorded within the 5-60m category, as a height category specific to the 132kV line was not recorded in these previous years. The number of birds at collision height for the 132kV line is taken as 60% of flights recorded at collision height (5-60m). This percentage has been rounded up from 54.6% (i.e. the 132kV potential collision band as a proportion of the 400kV potential collision band) and is considered to represent a cautious approach to adopt.

1.1.7 Revised Collision Modelling

- 1.1.7.1 The methods which have been adopted in estimating bird collisions with the existing 132kV and proposed 400kV lines are presented as a separate document (see Bird Collision Estimation Methods paper, which is presented in Annex 8 of this Addendum). As requested by SNH, the revised collision modelling methods provide a recalculation of collision risk of the proposed line incorporating 2004, 2005 and 2006 survey data (with an explanation of calculations made and justification of parameters used).

1.1.8 Approach to the Assessment

- 1.1.8.1 The process of ecological assessment of the impacts/effects of a development on a European site (i.e. SPA, SAC or Natura 2000 site) is recognised to differ from environmental impact assessment. The main requirement of ecological assessment for Natura 2000 sites is to provide information to allow the Competent Authority (in this case the Scottish Ministers) to assess whether the integrity⁶ of the site will be adversely affected in view of the site's qualifying interests and conservation objectives (i.e. the reasons for which the site was classified or designated).
- 1.1.8.2 In order to provide a structured approach to assist in determining any adverse effect on site integrity the information provided for each of the special studies includes the following:

⁶ The integrity of a site is the coherence of its ecological structure and function, across its whole area, which enables it to sustain the habitat, complex of habitats and/or levels of populations of the species for which it was classified.

- identification of potential impacts;
- specific mitigation measures to minimise impacts
- review of qualifying interests and conservation objectives; and
- assessment based on the residual impacts, specifically in relation to the qualifying interest and conservation objectives to identify any adverse effect on integrity.

1.1.8.3 The approach adopted is similar to that used in ecological impact assessment which assists in objective assessment. However, the focus of the exercise is the impact upon conservation objectives and thus any effect on site integrity. . Section 22.1.6 of Technical Annex 22.1 of the ES outlines the methods of assessment and prediction of impacts. Table 22.16 and Table 22.17 in the Technical Annex of the ES provide guidance on the assessment of impact magnitudes and significance of effect on site integrity.

1.1.9 Suitability of Assessment

1.1.9.1 This paper provides a revised assessment of all potential effects of merlin using the Drumochter Hills SPA.

1.1.9.2 The assessment included the completion of a comprehensive desk study and consultation process designed to gather existing information relating to merlin nest sites within the SPA and surrounding areas. The survey results (merlin specific survey, moorland breeding bird survey and summer flight activity survey) were combined in order to map and evaluate information relating to suitability of habitat, flight activity and the likelihood of breeding within the study area.

1.1.9.3 Both the merlin specific survey and the flight activity surveys were undertaken according to the monitoring methods described by Gilbert *et al.* (1998), which were in turn based on those adopted for the 1993-94 national merlin survey (Rebecca & Bainbridge 1994, 1998), and SNH (2005) which gives a generic method statement for vantage point watch surveys. The generic breeding bird survey methodology was aimed at confirming presence of all breeding, open ground birds (including both merlin and their prey species). The approach used is an adaptation of the Constant Search Method (Brown & Shepherd 1993) for censusing upland breeding bird populations. In addition, information regarding merlin abundance, distribution and breeding status within the Drumochter Hills was taken from a merlin survey of the entire SPA commissioned in 2004 by SNH as part of site condition monitoring (Cooper & Gallacher 2004).

1.1.9.4 In response to comments from SNH a greater density and intensity of VP watches has been carried out within the Drumochter Hills SPA during the 2006 merlin breeding season (see Table 1 below).

Table 1: Hours watched per VP in the period April to July in 2004 and 2006 and April to September in 2005 (the range of 250m sections of the 400kV and 132kV study area that are in view from each VP are also given).

2004 APRIL – JULY			
Vantage Point Code	Total Hours Watched	Section Ranges 400kV	Section Ranges 132kV
D1	21	S277-S285	405-414
D2	21	S291-S298	419-427
D3	24	S293-S301	422-430
D4	24	S302-S309	430-438
D5	30	S310-S318	439-447
D6	33	S321-S328	449-457

2005 APRIL – SEPTEMBER			
Vantage Point Code	Total Hours Watched	Section Ranges 400kV	Section Ranges 132kV
D1	36	S277-S285	405-414
D2 ⁷	33	S289-S297	417-425
D3	33	S293-S301	422-430
D4	30	S302-S309	430-438
D5	33	S310-S318	439-447
D6	36	S321-S328	449-457

2006 APRIL – JULY			
Vantage Point Code	Total Hours Watched	Section Ranges 400kV	Section Ranges 132kV
D12	33	S277-S285	405-413
D11	33	S280-S289	410-417
D10	33	S285-S293	414-421
D9	33	S289-S297	418-425
D8	33	S294-S302	422-430
D7	33	S298-S306	427-435
D6	33	S303-S310	431-439
D5	33	S308-S315	436-443
D4	33	S311-S319	440-448
D3	33	S316-S323	444-452
D2	33	S320-S327	448-456
D1	33	S325-S330	453-458

- 1.1.9.5 Together with VP watches carried out in 2004 and 2005, the summer flight activity surveys undertaken in 2006 have allowed three summer seasons of flight activity data to be collated and assessed for merlin.
- 1.1.9.6 Such a thorough and comprehensive approach to the survey work has ensured that there is a suitably detailed level of data available so as to allow a reliable assessment of the impact of the proposed project on the qualifying interests of the Drumochter Hills SPA. interest

1.1.10 Baseline Survey Results

Desk Study Records

- 1.1.10.1 The desk study in 2004, provided a record of a probable territory which, is within the SPA but outwith the survey corridor assessed. The location is one at which merlin have been seen regularly in previous years, although no evidence of breeding activity has been confirmed through desk study and fieldwork. There were no records of merlin nests within the SPA survey corridor found during the desk study.

Assessment of Suitable Breeding Habitat within the SPA Study Area

- 1.1.10.2 Within the proposed transmission line study area, heather was generally of low value for nesting merlin due to browsing and trampling by red deer (*Cervus elephus*) and historical muirburn practices. No carrion crow (*Corvus corone*) or hooded crow (*C. cornix*) nests were identified within the route corridor as alternative nesting sites for merlin. However, several areas of suitable habitat for breeding merlin were noted during the walkover survey (see Appendix I). These suitable areas were comprised of sheltered burns or gullies with deep heather to provide potential cover for nesting. No crow nests were found within the area of coniferous plantation along the A9 corridor, potentially as a consequence of moorland predator control.

⁷ The location of VP D2 was slightly altered in 2005 therefore resulting in a change in the 250m sections covered by the viewshed.

Assessment of Breeding

- 1.1.10.3 The species-specific merlin survey and the moorland breeding bird survey undertaken in 2004 did not indicate any breeding or attempted breeding within the proposed transmission line study area. The closest suspected territory was 1.4km to the west of the proposed route at its closest point.
- 1.1.10.4 Further data on merlin recorded during the breeding bird survey of the entire transmission line corridor undertaken in 2005 is given in the Ecological Addendum to the ES, though again, no evidence of breeding was recorded within the Drumochter Hills study area. .
- 1.1.10.5 During summer flight activity surveys carried out in 2006 a pair of merlin was confirmed to be breeding within the transmission line corridor through the Drumochter Hills (approximately 500m from the existing 132kV transmission line and less than 500m from the proposed 400kV transmission line).

Assessment of Flight Activity

- 1.1.10.6 Very low levels of merlin flight activity were detected during 2004 within the proposed transmission line study area. With only four flights recorded from all surveys this indicated that there was no breeding and limited hunting within the study area.
- 1.1.10.7 The three merlin flights observed during the VP watches in 2004 along the Drumochter Pass are detailed in Figure 22.11 of the Technical Annex of the ES. Of the three flights recorded from the VPs only one flight crossed the route of the proposed 400kV transmission line. Three out of the four flights recorded from all survey methods were outwith the SPA, were very short in both distance and duration, and involved birds flying down into heather cover. One further flight was seen within the SPA corridor during the first moorland breeding bird survey on 12th May 2004. This involved a bird flying out of the sight from the surveyor along a very steep-sided gully, and, accordingly, the total duration and direction of flight could not be mapped. This sighting is detailed on Figure 22.11 of the Technical Annex of the ES.
- 1.1.10.8 During 2005 three flights were observed during VP watches along the Drumochter Pass. None of these flights actually crossed the routes of the proposed 400kV transmission line or existing 132kV transmission line, nor indeed did they come within 100m of either line.
- 1.1.10.9 During the period April to July 2006 (inclusive) a total of 39 merlin flights were recorded from VP watches along the Drumochter Pass A total of 31 of these flights were recorded from a single VP and are flights associated with a breeding pair and nest site⁸ (the pair were not present during the 2004 or 2005 surveys, see below for discussion). The position of the VP used in 2006 is 350m away from the position for the corresponding VP in 2004 and 2005. The core of the flight activity associated with the nest site is approximately 575m away from the location of the 2004 and 2005 VP position and falls within the viewshed for this VP. Therefore, it is considered very likely that flights would have been recorded in 2004 and 2005 had there been corresponding flight activity in these years associated with a breeding attempt at the same location. In other words, on this basis, and taking into consideration the flight activity survey results and the breeding merlin surveys in 2004 and 2005, it is thought unlikely that a breeding pair were present in this location or the immediate surrounds in 2004 or 2005.
- 1.1.10.10 The majority of the flights associated with the nest site identified in 2006 did not cross or fall within 100m of either the proposed 400kV line or the existing 132kV line. Of the 39 flights recorded during the period April to July 2006, 5 flights crossed the proposed 400kV transmission line corridor and four of these flights also crossed the 132kV line, or passed within 100m (see Table 2).

⁸ VPs within the vicinity of the nest site were undertaken under SNH licence number 7061 and maintained at a 300m buffer from the nest site.

Table 2: Merlin flights for 2004, 2005 and 2006 that either crossed the 400kV or 132kV lines or passed within 100m of these lines.

2004						Height		
Flight Number	VP	400kV	132kV	Month	No. of birds	⁹ <5m	5-60m	>60m
3715	D5	Within 100m	Crossed	May	1	15	15	

2005						Height		
Flight Number	VP	400kV	132kV	Month	No. of birds	<5m	5-60m	>60m
No flights recorded crossing the lines or within 100m of the lines								

2006						Height			
Flight Number	VP	400kV	132kV	Month	No. of birds	<5m	5-35m	35-65m	>65m
15	D4	Crossed	Crossed	April	1		5	15	10
3	D2	Crossed		May	1	15			
33	D3	Crossed	Crossed	July	1	15	45		
34	D4	Crossed	Crossed	July	1		40		
40	D5	Crossed	Within 100m	July	1		5		

Results of SNH 2004 Survey

- 1.1.10.11 The following is a summary of the merlin survey commissioned by SNH completed in 2004 (Cooper & Gallacher 2004). The main area of heather dominated habitat within the SPA lies on either side of the central glen known as the Drumochter Pass, which includes the transmission line route. Elsewhere within the SPA, suitable habitat was found on the western periphery of the site along Loch Ericht and in the Cama' Choire area towards the eastern boundary.
- 1.1.10.12 The survey detected the presence of merlin in four locations within the SPA, with birds at two of these locations providing evidence of territorial behaviour or potential breeding.
- 1.1.10.13 To the west of the proposed 400kV overhead transmission line route there were four sightings of a male and two sightings of a female between April and July, with birds moving between two locations along the glen (within 1.3km of the proposed transmission line route at the most easterly of these two points). Although territorial behaviour was displayed on several occasions and breeding suspected, no nest site was located.
- 1.1.10.14 To the east of the proposed 400kV transmission line, on one occasion during May a merlin was heard alarm calling below the rim of the crag within 100m of the proposed transmission line route, although no bird was sighted (). Prey remains were found nearby. There were no further signs of presence on subsequent visits to the area.
- 1.1.10.15 A pair of merlin was disturbed in birchwoods on the banks of Loch Ericht, 6.25km west of the proposed 400kV transmission line route, in May and again in July. To avoid further disturbance these sightings were not investigated until August, when a pair were again seen both at and around the suspected nest site.. However, no nest site was confirmed and no juveniles were seen.
- 1.1.10.16 Approximately 1.5km east of the proposed transmission line route, a male was flushed from the burn and flew up the hillside and outwith the SPA (). However, there were no further signs of presence on subsequent visits to the area.

⁹ Figures given in the height bands columns represent the amount of time in seconds the bird was recorded in flight at the given height.

1.1.11 Evaluation of Study Area for Merlin

1.1.11.1 The VP watches in 2006 confirmed the presence of a merlin nest site within the transmission line corridor through the Drumochter Hills .

1.1.11.2 The presence of a breeding pair resulted in an increase in activity within the study area as compared with the previous surveys in 2004 and 2005. The core of this activity is restricted to the immediate vicinity of the nest site. The use of the study area as a whole (containing both the existing 132kV and the proposed 400kV line) by breeding/foraging merlin is considered to be low.

1.1.12 Potential Impacts

1.1.12.1 Potential impacts resulting from the proposed project within the Drumochter Hills SPA include:

- the construction of new infrastructure, (including possible excavation of borrow pits), tower bases & foundations, stringing of lines, site compounds and access tracks (including upgrades to existing tracks), clear fell of plantation and woodland areas, construction of temporary laydown areas and site office(s);
- post-construction (operational) activities, including routine line and overhead corridor maintenance works, and the potential need for emergency works; and
- dismantling of the existing 132kV and eventual re-stringing/ decommissioning of the proposed 400kV lines, including the removal of redundant infrastructure, access to working areas, destringing / dismantling of towers and associated foundations, construction of new access tracks (temporary & permanent) and upgrades to existing roads, construction of temporary laying down area and temporary site office(s).

1.1.12.2 It is considered that these activities could potentially result in the following potential direct and indirect impacts upon merlin within the Drumochter Hills SPA:

Construction Phase

- disturbance due to increased human activity and vehicular access; and
- habitat loss/displacement and/or damage.

Operational Phase

- indirect and direct habitat loss due to displacement and barrier effects;
- management of overhead corridor resulting in habitat damage/loss and /or disturbance;
- disturbance due to increased human activity and vehicular access;
- potential bird collisions with wires (conductors and earth wires) and/or towers; and
- potential electrocution.

Dismantling Phase (132kV and 400kV transmission lines)

- disturbance due to increased human activity and vehicular access;
- habitat loss and/or damage;
- habitat gain as a result of removal of redundant transmission line structures; and
- reduction in potential collision risks with towers and conductor/earth wires.

1.1.13 Specific Mitigation Measures

1.1.13.1 The following agreed mitigation measures are specific to the Drumochter Hills SPA and include all those measures which are relevant to merlin and the SPA.

Construction Phase

1.1.13.2 The framework outlined in the Access Strategy set out in Appendix D of the ES would be used to define the protocol for constructing access tracks to facilitate construction of the 400kV overhead transmission line. No permanent access tracks would be constructed within the sensitive ecological area defined as the Drumochter Hills SPA, and all temporary tracks used for construction of the new overhead transmission line would be fully restored. Existing access

- tracks would be used wherever possible to transport equipment and materials to tower construction locations.
- 1.1.13.3 No site compounds would be located within the Drumochter Hills SPA.
- 1.1.13.4 Borrow pits would not be located within the Drumochter Hills SPA.
- 1.1.13.5 A SHETL environmental representative would attend site during the construction period and would be supported by appropriate ecological advisors as required. The representative would ensure that all environmental mitigation measures set out in this Special Study, the ES, the Construction Procedures Handbook and any subsequent consent related commitments were delivered and, also, that the contractor's own Environmental Management System was successfully implemented.
- 1.1.13.6 The working and storage areas would be kept to the minimum necessary for safe implementation of the works. The site boundary would be clearly marked in all areas identified in the Construction Procedures Handbook as necessary to protect ecological or other interests. All such areas would be fully restored at the end of construction.
- 1.1.13.7 Exclusion zones within the working corridor would be clearly delineated on the ground to avoid construction staff straying into sensitive areas.
- 1.1.13.8 Restoration plans for all sites of ecological value (including Drumochter Hills SPA) would be included within the Construction Procedures Handbook.
- 1.1.13.9 A breeding bird survey would be carried out by suitably experienced ecologists/ornithologists at an appropriate time of year, and using methods discussed with SNH, in order to inform the micro-siting of access tracks and towers. The detailed locations of access tracks and towers would be identified in the Construction Procedures Handbook.
- 1.1.13.10 No construction would take place during the merlin breeding season (typically April to July inclusive¹⁰) where it would result in disturbance to nest sites in the Drumochter Hills SPA study area. Should any nesting merlin be identified either during the pre-construction surveys or after construction has begun, an appropriate buffer zone between the nest site and development corridor would be identified by the SHETL environmental representative, (with advice from an ecologist), and maintained until the birds left the nest. Appropriate exclusion zones for any nest sites confirmed during pre-construction surveys would be established on a site-specific basis (since these depend upon local topography, existing woodland screening and levels of existing human activity) and would be agreed in consultation with SNH. As a guide figure, exclusion zones from nest sites would be 300m (nestling stage) to 400m (nest building stage) as recommended within best practice forestry working guidelines (Currie, 1997). The environmental representative (with additional ecological expertise, as required) would determine when dependant young are no longer present.
- 1.1.13.11 Access track construction, tower erection and/or stringing outwith any nest site exclusion areas would also be considered in areas where merlin are breeding. Travel along access tracks during the merlin breeding season (April to July inclusive) would be minimised (e.g. by stockpiling of materials outwith sensitive periods). The exact number of vehicle movements would be determined according to the particular sensitivities, (topography, etc) found in specific locations. The limitations placed upon construction works and vehicle movements would be determined by the SHETL environmental representative (with additional ecological expertise, as required), to minimise the risk of disturbance to merlin.
- 1.1.13.12 Although helicopters would be used for stringing the conductors this would not take place during the merlin breeding season, and an exclusion zone would be set up around a nest site. As a guide figure, the exclusion zone would extend up to 1km from the nest, although the precise distance would be finally determined by appropriate ecological advisors, in consultation with SNH, on a site-by-site basis (i.e. dependent on site topography, and other factors).

¹⁰ Adults return to breeding sites in April (but sometimes earlier) with peak egg laying late-May to early June in Scotland. Incubation is 28-32 days and fledging period 25-27 days, young being dependent for a further 14-28 days later. This means that young may possibly (although not typically) still be dependent on their parents into August.

Operational Phase

Routine Maintenance

- 1.1.13.13 Routine maintenance proposals (which would consist of line inspections) within the Drumochter Hills SPA would be subject to a maintenance plan to be provided to SNH;
- 1.1.13.14 Routine maintenance would be undertaken with due regard to the protection of important and sensitive habitats, and best practice that minimises environmental impact would be adopted. A document would be prepared outlining the routine maintenance procedures;
- 1.1.13.15 Maintenance Plans would be produced to ensure habitat management within the working area is undertaken in accordance with appropriate best practice;
- 1.1.13.16 Significant maintenance activities which have the potential to cause disturbance to breeding merlin would not be undertaken within the bird breeding season (April to July inclusive), apart from where this could compromise security of supply or safety; and
- 1.1.13.17 All site staff would be briefed on procedures to be implemented in the event that any nesting merlin are found within the maintenance or other work areas. Work would stop until specialist advice was obtained and implemented. For example, if maintenance was required within 500m of a merlin nest, this work would be carried out following liaison with SNH and under the guidance of an ecological advisor.

Emergency Works

- 1.1.13.18 In the unlikely event that emergency works are required, such works would be carried out with due regard to the protection of the Drumochter Hills SPA and to minimise the risk of disturbance to its qualifying protected species. This would be ensured through the preparation of an emergency works environmental action plan to ensure minimal environmental impacts.

Dismantling Phase - 132kV Line

- 1.1.13.19 The framework outlined in the Access Strategy set out in Appendix D of the ES would be used to define the access protocol for dismantling the 132kV overhead transmission line. No permanent access tracks would be constructed within the Drumochter Hills SPA and all temporary tracks used for construction of the new overhead transmission line and dismantling of the existing 132kV line would be fully restored. Existing access tracks would be used wherever possible to transport equipment and materials to tower construction locations.
- 1.1.13.20 In all areas of the Drumochter Hills SPA where there are no existing access tracks, low ground pressure plant would be used where possible to access tower locations and areas between towers (see Access Strategy in Appendix D of the ES).
- 1.1.13.21 In liaison with the ecological advisor, the SHETL environmental representative on site would ensure that due regard is given to the statutory protection of breeding merlin under the Wildlife and Countryside Act 1981.
- 1.1.13.22 Should any nesting merlin be identified either in the pre-dismantling surveys, or after dismantling has begun, an appropriate buffer zone between the nest and the development corridor would be identified by the SHETL environmental representative, and maintained until the birds have left the nest. Appropriate exclusion zones would be established on a site-specific basis (since these depend upon local topography, existing woodland screening and levels of existing human activity) and would be agreed in consultation with SNH. As a guide figure, exclusion zones from nest sites would be 300m (nestling stage) to 400m (nest building stage) as recommended within best practice forestry working guidelines (Currie, 1997). The environmental representative (with additional ecological expertise, as required) would determine when dependant young are no longer present.
- 1.1.13.23 All site staff would be briefed on procedures which would be implemented if any nesting merlin were found within the dismantling area. Work would stop in the area until specialist advice was obtained and implemented.

Dismantling Phase - 400kV Line

- 1.1.13.24 A full assessment of the impacts on the ecological resource of dismantling the 400kV transmission overhead transmission line corridor would be undertaken prior to dismantling the line. Mitigation is likely to involve measures similar to those defined for dismantling of the 132kV overhead transmission line and would include a commitment to implementation of best practice environmental measures on site as appropriate for particular locations and time periods.

1.1.14 Assessment of Impact for the Mitigated Project

- 1.1.14.1 The following provides an assessment of post mitigation impacts on the Drumochter Hills SPA, related to the various phases of the proposed project and based on the recorded evidence of merlin from surveys undertaken in 2004, 2005 and 2006.

Construction Impacts

Disturbance Due to Increased Human Activity and Vehicular Access

- 1.1.14.2 Construction of the proposed overhead transmission line has the potential to result in increased temporary disturbance to breeding and hunting merlin. There would be a general increase in human activity and activity in areas of the Drumochter Pass where localised disturbance levels are relatively low and where merlin are likely to be habituated to any current disturbance (e.g.. from passing vehicles on the A9 trunk road and railway).
- 1.1.14.3 Summer flight activity surveys in 2006 confirmed the presence of one pair of breeding merlin less than 500m from the proposed 400kV transmission line. If this, or other, nest sites were confirmed during a pre-construction survey, measures would be put in place to avoid any disturbance to the birds. Reference is made to paragraph 1.1.13.10 where the approach to establishment of an exclusion zone is explained.
- 1.1.14.4 The core area of flight activity associated with the nest did not extend either to the route of the proposed 400kV line or the existing 132kV line. It is considered that this can be explained, at least in part, by the proximity of the A9 trunk road. The survey work confirmed that, outwith the core flight area of the nest site, merlin activity was relatively low.
- 1.1.14.5 Given the findings of the survey work, the mitigation measures that would be in place, and the fact that merlin move to lower ground away from the hills outwith the breeding season, it is therefore considered that there would not be a significant disturbance impact on merlin during the construction phase.
- Impact Magnitude: Negligible
 - Impact Significance: None¹¹

Habitat Loss or Damage

- 1.1.14.6 Summer flight activity surveys in 2006 confirmed the presence of one pair of breeding merlin nesting less than 500m from the proposed 400kV line (and approximately 500m from the existing 132kV line). Therefore, there would be no loss of nest sites.
- 1.1.14.7 Loss of or damage to merlin foraging habitat would result due to the construction of access tracks and towers and from minimal felling of trees where access tracks pass through existing plantation woodland. However, design mitigation measures have ensured that habitat loss and damage would be temporary and minimised. This would be achieved by upgrading existing tracks wherever possible and where this is not possible by using temporary access tracks. The routing of temporary access tracks would take account of the need to avoid tree felling. Tracks would be subject to appropriate full restoration. Full details of these measures are set out in the Drumochter Hills Restoration Plan which is Annex 1 to this Addendum. Micrositing of towers would be undertaken to avoid wherever possible disturbance or damage to areas of potential breeding merlin habitat

¹¹ There is no category for Negligible impact significance given in table 22.17 of Technical Annex 22.1 to the ES. Therefore the significance of all impacts recorded in the ES as Negligible has been reviewed and altered to either being Minor or None to correspond to the guideline criteria given in table 22.17.

- 1.1.14.8 The extent of heather-dominated moorland that would be lost or damaged as a result of construction is considered to represent a negligible loss of hunting habitat for birds in relation to the area of available habitat, and this would be off-set by dismantling of the existing 132kV line. No crow nests were located within the area of plantation (or occasional scattered trees) which could potentially be used as alternative future nesting areas for merlin within the construction corridor. Furthermore, only minimal tree felling would be required during the construction or upgrading of access tracks.
- 1.1.14.9 Only a small amount of potentially suitable habitat would be lost around the footprint of each tower, and micro-siting of towers during construction would ensure that wherever possible no suitable areas (e.g. sheltered burns or gullies with deep heather to provide potential cover for nesting) would be directly affected.
- 1.1.14.10 It is therefore considered that habitat loss during construction would not adversely affect the Drumochter Hills SPA.
- Impact Magnitude: Negligible
 - Impact Significance: Minor

Operational Impacts

Disturbance Due to Increased Human Activity and Vehicular Access

- 1.1.14.11 Limited disturbance to merlin may occur should emergency works be required during their occupancy in the breeding season. However, in the unlikely event that emergency works are required, works would be carried out with due regard to the protection of the Drumochter Hills SPA and to minimise the risk of disturbance to merlin. This would be ensured through the preparation of an emergency works environmental action plan to ensure minimal environmental impacts.
- 1.1.14.12 Routine maintenance proposals (which would consist of line inspections) within the Drumochter Hills SPA would be subject to a maintenance plan to be provided to SNH. No routine maintenance having the potential to cause disturbance to breeding merlin would be undertaken within the breeding season, unless, this could compromise security of supply or safety.
- Impact Magnitude: Negligible
 - Impact Significance: Minor

Habitat Loss or Damage

- 1.1.14.13 It is predicted that there would be very little additional direct habitat loss or damage during the operational phase, e.g. due to routine maintenance or emergency works. However, some small-scale loss/damage may result if, for example, construction of temporary access tracks were required.
- Impact Magnitude: Negligible
 - Impact Significance: None

Predation

- 1.1.14.14 Merlin nests can be predated by crows (Rebecca & Cosnette, 2003) and other raptors. However, it is considered unlikely that the dismantling of the existing 132kV transmission line and construction of the 400kV transmission line would result in any increase in perching places for crows (the 400kV line would have fewer towers). In addition, there is currently a low corvid population in the area (no crow nests were recorded within the study area) and it is considered that merlin nests within the SPA are therefore unlikely to be the subject of any increased aerial or terrestrial predation as a result of the new transmission line. An overlap of the two lines could potentially lead to a temporary increase of perching places. However, SHETL have confirmed that there would be no overlap of the two lines within the main breeding season (April to July inclusive). It should also be noted that a pair successfully bred in 2006 at approximately 435m from the existing line, with no known adverse effects due to predation.
- Impact Magnitude: Negligible

- Impact Significance: None

Displacement and Barrier Effects

- 1.1.14.15 Throughout the Drumochter Hills SPA the existing and proposed lines follow a very similar route. Displacement effects could potentially result from the presence of the proposed 400kV line as a new man-made structure, preventing merlin from using foraging or breeding habitat in the vicinity of the transmission line. It is recognised that potential displacement effects are difficult to assess. However, a merlin was observed actively hunting a meadow pipit around and between the conductors of the existing 132kV line, just to the north of the Drumochter Hills SPA (Dr Andy Mackenzie, pers. com. 2004). This behaviour would suggest very strongly that there is no real possibility of substantial displacement effects as regards foraging habitat.
- 1.1.14.16 The proximity of the nest site identified during survey work in 2006 (less than 500m from the proposed 400kV line and approximately 500m from the existing 132kV line) also suggests that merlin nesting sites are not displaced to any significant degree. The ES reported breeding and possible breeding of merlin at similar distances and closer distances along the route of the existing 132kV line in a number of areas, indicating that displacement effects in relation to breeding sites are likely to be negligible as a result of the proposed 400kV line.
- 1.1.14.17 Barrier effects could potentially result from the presence of the overhead transmission line, preventing merlin from crossing the route of the proposed 400kV line and using the surrounding area. Given that the route of the proposed 400kV line follows very closely the route of the existing 132kV transmission line, in close proximity to the very busy A9 trunk road and the Perth to Inverness mainline railway; it is considered that this major infrastructure corridor will remain materially unchanged from the existing baseline. As a consequence it is considered that barrier effects are likely to be negligible as a result of the proposed 400kV line. Given that merlin flights are typically low (i.e. <5m above ground level), a possible benefit of the proposed 400kV line (in comparison to the existing 132kV line) is that the lowest height of the conductor would be higher on the proposed 400kV line (6.7m to 7.6m above ground level). It is considered that this may reduce any potential barrier effects currently associated with the existing 132kV line.
- 1.1.14.18 Therefore, in terms of displacement and barrier effects it is considered likely that merlin will habituate to the proposed 400kV line in a similar way as they appear to have habituated to the existing 132kV line (and associated infrastructure corridor).
- Impact Magnitude: Negligible
 - Impact Significance: None

Displacement of Prey

- 1.1.14.19 The breeding bird survey was not specifically designed to compare potential differences in merlin prey density between the existing line and surrounding land. However, from the data available it appears that there is no marked change in the apparent density of meadow pipits in the vicinity of the existing 132kV overhead transmission line when compared with the adjacent open ground. However, it is possible that the habitat of ground-nesting birds could become less favourable as a result of the presence of towers and associated wires displacing birds of open ground (due to perceived or actual increased danger from perching predators).
- 1.1.14.20 The moorland and woodland habitat within the SPA is fairly homogeneous and it is likely that, if displacement were to occur, prey species such as meadow pipits would merely relocate to an adjacent area of similar habitat. Given the large range over which merlin forage¹², it is considered that the area of habitat from which merlin prey species could potentially be displaced represents a negligible loss of feeding resource for merlin in relation to the area of available habitat within the SPA and surrounding areas.
- Impact Magnitude Negligible
 - Impact Significance None

¹² Merlin tracked by radio telemetry hunted at least 4km from the nest in Wales (Rebecca *et al.* 1990 and foraging flights of six breeding males averaged from 3-5km in an Alaskan study (Schempf 1989). Home ranges of three breeding males in a Montana study were 13, 23 and 28km², each bird travelling up to 9km away from its nest. In the Grampians, mean minimum distance flown by merlin to hunt ringed lapwing (*Vanellus vanellus*) chicks was 3.4 +/- 1.1km, with a range of 2.0 to 5.6km (Rebecca *et al.* 1990).

Potential Bird Collisions with Wires (Conductors and Earth Wires) and/or Towers

- 1.1.14.21 Bird mortality due to collision is considered to potentially represent the most important impact of power lines on merlin. For a review of risk factors of collision mortality with power lines for different bird groups, refer to Section 22.22 of the Technical Annex to the ES. Although raptor flights often occur within the potential collision risk band of power lines, raptors are highly manoeuvrable with generally low wing loading. Merlin are not considered to be at high collision risk from transmission lines when considered in relation to the proposed 400kV and existing 132kV lines, and this view is consistent with scientific opinion generally. However, it is important to consider potential impacts of the proposed 400kV overhead transmission line on potentially vulnerable, dispersed populations of raptors such as the merlin population within the Drumochter Hills SPA.
- 1.1.14.22 Birds can collide with power lines because they can be difficult to see, although the degree of risk depends on a number of factors. These include: characteristics and behaviour of the species concerned; environmental factors; and type and design of the power lines themselves. In most cases the physical impact of collision leads to immediate death or to fatal injuries and mutilation, although some birds may recover. The majority of bird collisions appear to be associated with earth wires, normally installed above the conductors, and less visible than the conductors (which are of a greater diameter and can also be bundled, further increasing their visibility) (e.g. Scott *et al.* 1972). Therefore, birds seem to be generally capable of recognising the supporting towers and conductors, but the earth wire can in certain situations appear almost invisible because of background or lighting conditions, and bird collisions result (APLIC 1994). Also important is that birds may take avoiding action from the towers and conductors by increasing flight height, resulting in collision with the earth wire.
- 1.1.14.23 The methods used to derive an estimate of the risk of collision with the proposed transmission line for merlin within the SPA, are summarised below and set out in greater detail within the Bird Collision Estimation Methods paper (see Annex 8). The summer flight activity survey data recorded in 2004 was analysed and presented in the ES (Technical Annex 22.11). However, following comments from SNH (see section 1.1.1 of this document) further summer flight activity surveys were undertaken in 2005 and 2006. The risk of collision with the proposed and existing transmission lines has been re-calculated using a revised methodology as described in the Bird Collision Estimation Methods paper for each year of the survey: 2004; 2005; and 2006.
- 1.1.14.24 Table 1 presents the hours watched from each VP in 2004, 2005 and 2006.
- 1.1.14.25 Table 2 gives the flights recorded from VPs for the Drumochter Hills SPA that either crossed the route of the proposed 400kV line or the existing 132kV line or passed within 100m of these lines.
- 1.1.14.26 In order to provide data to allow collision mortality modelling to be undertaken for the full extent of the proposed line running through the Drumochter Hills SPA, viewpoints were chosen which provided suitable viewsheds. The area over which viewsheds were distributed extends approximately 1km past the northern boundary of the SPA and 800m past the southern boundary of the SPA. From the viewpoints, flights were observed and mapped on to suitably scaled field maps. These were later digitised and analysed in order to identify the number of flights within 250m sections of the proposed and existing lines. With respect to the proposed 400kV line, there are 53 x 250m sections, a total distance of 13.25km. With respect to the existing 132kV line, there are 54 x 250m sections, a total distance of 13.5km. ..
- 1.1.14.27 In order to calculate the level of annual activity based on the sample of flights given in Table 2, it is necessary to calculate the number of hours in the breeding season over which birds could potentially be active. This has been done using published sunrise and sunset times for April to August (representing the residence period) in order to estimate the total number of hours for each month (see Table 3). The figures given in Table 3 have been applied to each year of survey. The total figure for each month represents the total daylight for that month from sunrise to sunset. The residence period, covers the time from arrival of the parents at the nest site, to the departure of the young, following their period of post-fledging occupancy in the vicinity of the nest site.

Table 3: Estimate of merlin annual total 'residence' period within the study area.

Month	Hours
April	431.5
May	514.7
June	534.5
July	531.5
August	468.3
Total	2,480.5

- 1.1.14.28 For the original analysis presented in the ES, based solely upon 2004 data, annual activity levels were derived from data collected between the months of May to July inclusive. This was because no flights were recorded in April and as no watches were carried out in August, it was considered that inclusion of these months would give too low an estimate.
- 1.1.14.29 No merlin flights were recorded crossing or passing within 100m of the either the 400kV transmission line or 132kV transmission line during surveys undertaken in 2005. As such, it has not been possible to estimate potential merlin collisions in 2005.
- 1.1.14.30 Birds were recorded in April 2006 and so the period over which activity levels have been calculated in 2006 is taken as April to July, July being the last month for which flight data is currently available. August and September data are not included in the calculations of annual activity levels as August - September 2006 data has not been fully analysed at the time of writing. However, based on a preliminary review of August and September data it is not considered likely that the inclusion of this data in the analysis would materially alter the conclusions of the assessment.
- 1.1.14.31 Tables 4a and 4b present the number of flights crossing the proposed and existing lines in relation to the 250m sections (see paragraph 1.1.14.27). Details of the methodology which was adopted in calculating this data are provided in the Bird Collision Estimation Methods paper.

Table 4a: Merlin transits estimated for the study area based on flights at all heights and flights at risk height (400kV).

	*Calc. Codes	Survey Year	2004	2005 ¹³	2006
1		No. 250m sections with transits (risk hgt.)	1	n/a	3
2		No. 250m sections with transits (all hgts.)	1	n/a	4
3	FR	Mean transits/250m/hr (risk hgt.)	0.00062	n/a	0.00229
4	FR	Mean transits/250m/hr (all hgts.)	0.00062	n/a	0.00286
5	TR	Potential residence period hr	2 480.5	n/a	2 480.5
6	$\Pi_{\text{risk height}}$	Total estimated annual transits at risk height for the study area	82.60	n/a	300.64
7	$\Pi_{\text{all heights}}$	Total estimated annual transits at all heights for the study area	82.60	n/a	375.80

Table 4b: Merlin transits estimated for the study area based on flights at all heights and flights at risk height (132kV).

	*Calc. Codes	Survey Year	2004	2005 ¹³	2006
1		No. 250m sections with transits (risk hgt.)	1	n/a	3
2		No. 250m sections with transits (all hgts.)	1	n/a	3
3	FR	¹⁴ Mean transits/250m/hr (risk hgt.)	0.00037	n/a	0.00167

¹³ No flights recorded crossing or passing within 100m of either transmission line from 2005 VP watches.

¹⁴ Number of birds at collision height for the 132kV line in 2004 is taken as 60% of flights recorded at collision height (5-60m) as the collision height band for the 132kV line (5-35m) was not recorded, i.e. the 132kV potential collision band as an approximate proportion of the 400kV potential collision band.

4	FR	Mean transits/250m/hr (all hghts.)	0.00037	n/a	0.00167
5	TR	Potential residence period hr	2 480.5	n/a	2 480.5
6	$\overline{TT}_{\text{risk height}}$	Total estimated annual transits at risk height for the study area	49.60	n/a	223.57
7	$\overline{TT}_{\text{all heights}}$	Total estimated annual transits at all heights for the study area	49.60	n/a	223.57

- 1.1.14.32 As can be seen from tables 4a and 4b the predicted total annual transits based on the 2004 data for the proposed 400kV line at both risk heights and all heights are 82.60 compared to 49.60 for the 132kV line. For the 2006 data the predicted total annual transits are 375.80 for the 400kV line and 223.57 for the 132kV line.
- 1.1.14.33 The estimated annual transit figures from Tables 4a and 4b are then used in the collision risk modelling to identify annual collision rates. The methods employed in reaching the figures shown in Tables 5a and 5b below (i.e. trigonometric and empirical), are fully explained in the Bird Collision Estimation Methods paper (Annex 8).
- 1.1.14.34 For the trigonometric method, unadjusted (i.e. assuming no avoiding action) collision rates have been determined using 0.222m as the maximum wing length for merlin (Snow & Perrins, 1998). The trigonometric model estimated collision rates for merlin at 8.72% for the 400kV line and 14.35% for the 132kV line.
- 1.1.14.35 In relation to the empirical model, Alonso & Alonso (1999) produced estimates of collision rates for numerous species on overhead transmission lines of various design (between 220kV and 380kV) in several study areas in Spain. This study looked at both flight frequency and estimated an annual collision rate from carcass searches beneath the lines. Alonso & Alonso calculated this rate from all flights crossing the transmission lines regardless of height. Although they did not record merlin during this study they did give rates for kestrel (*Falco tinnunculus*), a raptor of similar size and wingspan, within two different study areas. Although comparable in size, kestrel hunt for insects and small mammals using a gliding/hovering and aerial attack technique, whereas merlin tend to pursue passerines by flying low and fast over the ground and perching on lookout posts, often mimicking a mistle thrush-type flight whilst in pursuit. Although Alonso & Alonso did not record mistle thrush, they do give a figure for song thrush collision rate. It is considered that the collision rates recorded for these species represents a range in which merlin would fall. An average of the rates for these species gives a collision rate of 0.017% of flights. Including kestrel in the list of species on which to base the average collision rate would give a figure of 0.016%. Therefore, the slightly higher of the two collision rates has been used for estimating collisions for flights at all heights. The collision figure of 0.017% is considered to represent a realistic collision rate.
- 1.1.14.36 Based on the derived estimates for the empirical model, using the data for all flights, the collision estimate for the proposed 400kV line ranges from 0.01 merlin collisions per year (2004) to 0.06 merlin collisions per year (2006). For the trigonometric model, using the data for flights at risk height, collision risk for the proposed 400kV line ranges from 0.19 merlin collisions per year (2004) to 0.68 merlin collisions per year (2006). Using the 2006 data (i.e. the highest levels of flight activity recorded) and the mid-point value derived from the two models, the collision modelling predicts that the proposed 400kV line would result in 1 collision every 2.7 years, equating to 2.6% of the Drumochter Hills SPA population (cited as 7 pairs in the SPA citation).
- 1.1.14.37 For the existing 132kV line the corresponding figures range from 0.01 merlin collisions per year (2004) to 0.04 merlin collision per year (2006) for the empirical model. For the trigonometric model the figures range from 0.19 merlin collisions per year (2004) to 0.83 merlin collisions per year (2006). Again, using the 2006 data (i.e. the highest levels of flight activity recorded) and the mid-point value derived from the two models, the modelling predicts the existing 132kV line currently results in 1 collision every 2.3 years, equating to 3.1% of the Drumochter Hills SPA population.
- 1.1.14.38 The modelling therefore identifies that the existing baseline collision rate for the 132kV line is very similar to the predicted collision rate of the proposed 400kV line. Given the accepted limitations to collision modelling, the residual effect of replacing the existing overhead transmission line with the proposed 400kV line is therefore predicted to be neutral with no adverse effect on the Drumochter Hills SPA.

Table 5a: Merlin collision estimate summary for the study area 400kV transmission line corridor based on empirical and trigonometric methods (*see Bird Collision Estimation Methods paper for full explanation of the codes and fully worked example of the calculations).

	*Calc. Codes	Survey Year	2004	2005	2006
1	CR _{A&A} ¹⁵	Collisions/yr (empirical all hghts. – Alonso & Alonso)	0.01	n/a	0.06
2	CR _{trig.} ¹⁶	Collisions/yr (trigonometric risk height)	0.19	n/a	0.68
3		Collisions/yr mid-point of above range of values	0.10	n/a	0.37

Table 5b: Merlin collision estimate summary for the study area 132kV transmission line corridor based on empirical and trigonometric methods (*see Collision Estimate Methods paper for full explanation of the codes and fully worked example of the calculations).

	*Calc. Codes	Survey Year	2004	2005	2006
1	CR _{A&A}	Collisions/yr (empirical all hghts. – Alonso & Alonso)	0.01	n/a	0.04
2	CR _{trig.}	Collisions/yr (trigonometric risk height)	0.19	n/a	0.83
3		Collisions/yr mid-point of above range of values	0.10	n/a	0.44

- 1.1.14.39 In assessing the significance of the potential combined effects of the proposed 400kV and existing 132kV lines being in place at the same time during construction (i.e. due to increased levels of collision risk), SHETL have confirmed that both lines would not simultaneously be in place during the merlin breeding season (April to July). Therefore, the collision risk would only relate to flights associated with the proposed 400kV line (see Table 5a). Given that merlin generally disperse from their upland breeding sites immediately following completion of breeding (or prior to this if breeding has failed) a potential combined effect from both lines is not expected. As reported above, collision rate for the proposed 400kV line is predicted to be neutral with no additional adverse effect on the Drumochter Hills SPA merlin population.
- 1.1.14.40 As regards the estimated collision rate for the 132kV line presented in Table 5b, it is important to note that there is no evidence, anecdotally or otherwise, for a collision rate of this scale for the existing transmission line currently within or bordering the Drumochter Hills SPA. Therefore, the results of the collision risk analysis, both in terms of adverse and potentially positive effects, must be interpreted with caution. The model collision rate should not be assumed to be an accurate representation of actual or predicted mortality levels but rather should be taken to represent a relative index of collision risk. During the fieldwork completed for this assessment, comprising >750 hours between 2004-06 (including survey of a merlin nest site within 500m of the existing 132kV transmission line), there was no experience of merlin collisions, nor indeed was there observation of any flights where avoidance action was necessary. As discussed above, the experience was rather that merlin were comfortable flying around and between the conductors. This experience suggests that there is a considerable overestimate of collision risk in the modelling results. In addition, the pair of merlin breeding approximately 500m from the existing 132kV line during 2006 successfully reared two young (i.e. they were not killed through collision with the existing power line). Therefore, it is concluded that the true collision rate is probably less than that predicted by the trigonometric model and more realistically similar to the figure of 0.017% of all flights, taken from Alonso & Alonso (1999).
- 1.1.14.41 In a 1976 study, Brown considered collision with powerlines to be one of the main causes of injury to merlin in England. A 1989 BTO research report used mortality data from ringed birds (between 1909 and 1987) to assess the effects of collision with overhead power lines. A 'hit wire index' (HWI) was calculated based on the proportion of ringed birds found dead against the number that had a recorded cause of death as 'hit wire'. Of a total of 87 species included in the analysis, merlin were included as one of 7 species with a HWI of greater than 10.

¹⁵ A collision rate of 0.017% has been applied, taken from Alonso & Alonso (see text for further details).

¹⁶ A collision rate of 8.72% has been used with respect to the model for flights only at risk height with respect to the 400kV line and 14.35% with respect to the 132kV line.

However, of the 5 'hit wire' recoveries in Scotland, 4 were in coastal areas. These birds are therefore likely to be non-breeding, wintering birds that are less familiar with their surroundings. Although the BTO's study found dead birds throughout the Highlands, none of these were recoveries of ringed birds which had hit wires. Furthermore, the analysis was based on data gathered from both transmission and distribution power lines: the latter type are lower and are likely to be, through their design, much less visible to birds. The design of the proposed transmission line would involve bundled conductors (i.e. thicker and more visible conductors) and an earth wire of a much greater diameter than that used as a component part of lower voltage power lines (including 132kV transmission lines such as those found throughout the Scottish Highlands).

1.1.14.42 As discussed above, merlin are known to be extremely manoeuvrable in flight. The thicker earth wire and bundled conductors of the proposed design would make the structure more visible to birds than similar components of the existing 132kV transmission line. Given that an overhead transmission line is already in place within the SPA, it is considered that the inherent design features of the proposed transmission line (which would run almost in parallel with the existing line), would not provide a significant change to current baseline conditions in terms of collision mortality risk for merlin.

1.1.14.43 Drawing the foregoing discussion together, in the exercise of professional opinion it is assessed that the overall impact of merlin collision would be negligible with no perceptible effect on SPA population viability.

- Impact Magnitude: Negligible
- Impact Significance: None

Electrocution Risk

1.1.14.44 For a full overview of risk factors of electrocution by power lines for different bird groups, reference should be made to Section 22.6 in Chapter 22 of the ES. Electrocution occurs whenever a bird touches two phase conductors, or a conductor and an earthed structure (Bevanger, 1994) and can be a particular problem for power lines with a voltage of under 130kV (i.e. low voltage power lines) due to their design.

1.1.14.45 Risk factors for electrocution can be split into two areas: flight and nesting behaviour. Large size is by far the most important factor that makes certain raptors (e.g. eagles) susceptible to electrocution in certain circumstances, although tower/conductor design can also be an important contributory factor. Both phase-to-phase and phase-to-earth distances are greater in the proposed 400kV design than in the existing 132kV design. However, the distance of phase-to-phase and closest phase-to-earth contact for both power line types are significantly greater than the wingspan of golden eagle (i.e. the raptor with the largest wing span found in the region). Both phase-to-phase and phase-to-earth distances are also much greater than the combined wingspan of two golden eagles joined during display or by talon linking during territorial defence. The relatively small merlin wingspan therefore rules out the possibility of electrocution by phase-to-phase, phase-to-earth contact or tower and phase contact.

1.1.14.46 Further, merlin have never been recorded nesting on transmission lines in Britain, thereby removing any potential risk factors associated with transmission line nest sites.

1.1.14.47 Merlin may use the proposed overhead transmission line for perching whilst resting and foraging for prey; although this behaviour has not been recorded during any of the survey work reported here or during SNH surveys of the SPA in 2004 (Cooper & Gallacher 2004). Electrocution could potentially occur in this situation if a defecating bird allowed a phase-to-phase or phase to earth contact. However, the very low degree of risk involved under this scenario is considered to be similar for both the existing 132kV transmission line and the proposed 400kV transmission line, and is outweighed by any potential benefit that may be provided to birds perching on the line to locate prey (although this behaviour has not been observed during this study).

- Impact magnitude: Negligible
- Impact significance: None

Dismantling Impacts - 132kV LineDisturbance Due to Increased Human Activity and Vehicular Access

- 1.1.14.48 As discussed at 1.1.14.2 the dismantling of the 132kV overhead transmission line has the potential to result in increased temporary disturbance to breeding and hunting merlin.
- 1.1.14.49 If the 2006 nest site or other nest sites were confirmed during a pre-construction survey, measures would be put in place to avoid any disturbance to the birds. Reference is made to paragraph 1.1.13.10 where the approach to establishment of an exclusion zone is explained.
- 1.1.14.50 Merlin move to lower ground away from the hills following breeding (or prior to this if breeding fails) and are therefore not likely to be present within the SPA outwith the breeding season. Given the mitigation referred to above, there would be negligible disturbance to merlin during the dismantling phase.
- Impact Magnitude: Negligible
 - Impact Significance: None

Habitat Loss and/or Damage

- 1.1.14.51 Dismantling of the existing 132kV overhead transmission line has the potential to result in limited damage of merlin habitat compared with the current baseline situation due to the need for access to and between towers, and the removal of towers and their foundations. All access tracks used in the dismantling process within the SPA would be temporary and subject to restoration. Where possible, low ground pressure plant would be used in the dismantling works within the SPA, negating the requirement for construction of access tracks.
- 1.1.14.52 The area of potentially suitable heather moorland that would be damaged during dismantling is considered to represent a negligible, temporary loss of breeding/feeding habitat for merlin, in relation to the large area of available and suitable habitat.
- 1.1.14.53 No crow nests were located which could potentially be used as alternative nesting areas for merlin within the dismantling corridor. Furthermore, only minimal felling of coniferous trees would occur as a result of the dismantling work.
- Impact magnitude: Negligible
 - Impact significance: Minor

Removal of Potential Collision Risk with Wires (Conductors and Earth Wires) and/or Towers

- 1.1.14.54 The potential positive impacts (in terms of reduced potential collision risk) of dismantling the existing 132kV overhead transmission line has been considered in the assessment of overall collision risk reported at section 1.1.14.20 with respect to the proposed 400kV line, see above.
- Impact magnitude: None
 - Impact significance: None

Dismantling Impacts - 400kV Line

- 1.1.14.55 Future dismantling of the 400kV overhead transmission line has the potential to negatively impact on merlin, both directly and indirectly. Due to the anticipated passage of time between construction of the 400kV transmission line and dismantling (c.80 years), a pre-dismantling survey would be required during the breeding season prior to the start of dismantling works, in order to provide an up-to-date assessment of the population. It is therefore not possible to assess the potential impacts of dismantling the 400kV line. The scale and therefore significance of potential impacts upon the merlin population within the SPA would depend upon the status and distribution of the population and habitat quality within the SPA at the time of dismantling of the 400kV overhead transmission line. However, the nature of potential impacts and mitigation measures are likely to be similar to those involved in dismantling of the 132kV overhead transmission line, and any predicted significant impacts are likely to be successfully mitigated.

1.1.15 Assessment of Effect on Site Integrity

1.1.15.1 It has been explained in the introductory section that this Special Study has been prepared having regard to the statutory duty placed upon Scottish Ministers under Regulation 48 of the 1994 Habitats Regulations. The Scottish Ministers are obliged, as the competent authority for the purposes of determining electricity applications, to consider the effect of this project upon the Drumochter Hills SPA. It is accepted that the project is not directly connected with or necessary to the management of a European site. Consequently, SNH will require to advise Scottish Ministers whether the project is likely to have a significant effect upon the SPA, either on its own or in combination with other development. The preliminary opinion of SNH, based upon the information contained in the ES, is that it is likely that there will be a significant effect on the Drumochter Hills SPA and, accordingly, this Special Study report has been prepared in order to assist in determining the likely impact of the project on the conservation interests for which this SPA has been classified. The terms of Regulation 48(5) of the 1994 Regulations are such that, save for circumstances where there are considerations of overriding public interest (as set out in Regulation 49), the Ministers may agree to the project only after having ascertained, following assessment, that the plan or project will not adversely affect the integrity of the European Site.

1.1.15.2 Guidance is given as to the meaning of “integrity” in Appendix A to Annex E of the Circular on the Habitats and Bird Directives, where it is said that “the integrity of a site is the coherence of its ecological structure and function, across its whole area, which enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified”. In assessing whether the integrity of a European site is adversely affected many inter-related factors require to be considered¹⁷. This in itself demonstrates that the conclusion as to whether the integrity of a site is adversely affected cannot depend solely upon the output of collision risk modelling. Further, there is an increasing awareness amongst specialist ornithological ecological consultants of the limitations and weaknesses of collision risk modelling. Whilst, therefore, this Special Study has responded to the request by SNH for further modelling work to be carried out, conclusions regarding any potential impact on site integrity can only be reached on the basis of a broader assessment that considers the whole range of inter-related factors. The assessment that is provided in this section for the purposes of Regulation 48 will consider:

- Whether the particular operations arising from the project are likely to have a significant effect on the various qualifying interests of relevance to this SPA. This will involve a consideration of the potential effects arising from construction, operation and dismantling of the 400kV overhead transmission line and dismantling of the existing 132kV line. The operations considered are construction of access tracks, construction of the towers and stringing conductors, dismantling of the existing line, habitat loss, collision with the line and electrocution. In this regard the scale, longevity and reversibility of effects will be considered, together with any potential cumulative impacts.
- Where potential significant effects are identified consideration is given to mitigation measures that will avoid or reduce the effects.
- Thereafter the significance of the residual impacts is evaluated in relation to the nature of the impact (e.g. short/long term, reversible or irreversible), the importance of the interest affected and the overall effect on the site’s conservation objectives.

Assessment of Conservation Objectives

1.1.15.3 The following provides an assessment of the effect of the proposed Beaulay to Denny overhead transmission line project on the Conservation Objectives for the Drumochter Hills SPA.

To avoid deterioration of the habitats of qualifying species (merlin), or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained.

¹⁷ There is judicial support for such an interpretation to be found in the Opinion of Lord Nimmo Smith in the unreported case of *WWF UK and the RSPB v. SNH and Others*, dated 27th October 1998.

- 1.1.15.4 Careful consideration has been given to any effects that may result in the deterioration of the habitats or significant disturbance to merlin as a qualifying species of the Drumochter Hills SPA, according to the various phases of the proposed project, namely construction, operation and dismantling phases of the proposed 400kV line and dismantling of the existing 132kV line.
- 1.1.15.5 The project would not result in the loss of any merlin breeding habitat (nest sites), based on survey data from 2004, 2005 and 2006, and including SNH commissioned survey results (2004). Micrositing of towers would be undertaken during construction to avoid, wherever possible, disturbance or damage to areas of potential future breeding merlin habitat. A temporary loss of foraging habitat would result from the construction of access tracks for construction of the proposed 400kV transmission line and dismantling of the existing 132kV line, and from minimal felling of trees where access tracks pass through existing plantation woodland (although the use of these areas by prey species such as meadow pipit would not actually be precluded). However, as discussed at 1.1.14.7, habitat loss would be minimised. The extent of heather-dominated moorland that would be lost or damaged is considered to represent a negligible loss of hunting habitat for birds in relation to the area of available habitat.
- 1.1.15.6 Habitat loss due to the construction of towers will, in part, be off-set by the dismantling of the existing 132kV line. However, only a negligible amount of potentially suitable habitat would be lost around the footprint of each tower. This fact coupled with micrositing of towers during construction would ensure that wherever possible no suitable areas would be directly affected.
- 1.1.15.7 Disturbance effects (due to increased human activity and vehicle access) during all phases of the project have been carefully considered and appropriate mitigation provided to reduce such temporary disturbance factors to a level that would have no impact on the SPA. The presence and effects of the proposed 400kV transmission line as a new man-made structure have been considered in terms of potential displacement and barrier effects. Taking into consideration the route, and the height of the proposed 400kV line it is considered these effects would not result in an impact on merlin breeding and/or feeding sites.
- 1.1.15.8 Therefore it is considered that the project would not result in deterioration of the habitats of merlin. Furthermore, it is assessed that there would be no significant disturbance to merlin. It is therefore concluded that the integrity of the site would be maintained.

To ensure for the qualifying species that the following are maintained in the long term:

Population of the species as a viable component of the site

- 1.1.15.9 Full consideration has been given to potential effects that may result in adverse changes to the maintenance (in the long term) to the merlin population as a viable component of the SPA, according to the various phases of the proposed project. The following discusses the main potential effects which could result in changes to the population of merlin as a viable component of the SPA.
- 1.1.15.10 The proposed 400kV line would be closer to the nearest merlin nest site (based on 2004-06 data) than the existing 132kV line, and this could potentially increase the risk of collision with both adult and juvenile birds, which may be expected to be at greater risk of colliding with structures during the first few weeks following fledging. However, the desk study completed for the project has confirmed that merlin are known to breed within 500m of the existing transmission line between Beaulieu to Denny, with no known information suggesting that these birds are at high collision risk with the transmission line. Professional judgement has been exercised in the assessment of the potential for merlin to collide with towers, conductors or earthwires. This professional judgement has been informed by available literature, experience in the field, and the analysis of flight activity data to derive estimates of collision rates. Merlin collision with transmission lines such as the proposed 400kV line is considered to represent low levels of risk. The modelling predicts that the existing baseline collision rate for the 132kV line is very similar to the predicted collision rate of the proposed 400kV line. Given the accepted limitations of collision modelling, the effect of replacing the existing overhead transmission line with the proposed 400kV line is therefore predicted to be neutral.
- 1.1.15.11 Electrocution risk has been considered. The design of the proposed 400kV transmission line means that the distance of phase-to-phase and phase-to-earth or the span across an insulator between a conductor and a tower is beyond the wingspan reach of merlin and therefore rules

out the possibility of electrocution. Electrocution could potentially occur if a perching bird defecates and forms a phase-to-phase or phase-to-earth contact. However, this scenario is considered a very low risk, with no known reports of this occurring to merlin on overhead transmission lines.

- 1.1.15.12 Therefore, in considering the potential effects of the various phases of the proposed project, no residual population effects (i.e. taking into consideration the dismantling of the existing 132kV line and construction of the proposed 400kV line) have been identified which would effect the long-term maintenance of the merlin population in the Drumochter Hills SPA. Therefore it is concluded that the project would not affect maintenance in the long term of the merlin population as a viable component of the Drumochter Hills SPA.

Distribution of the species within the site

- 1.1.15.13 Consideration has been given to any potential effects that could adversely impact on the long-term maintenance of the distribution of merlin within the Drumochter Hills SPA.
- 1.1.15.14 The project would not result in the loss of any merlin breeding habitat (nest sites), and micrositing of towers would be undertaken during construction to avoid wherever possible disturbance or damage to areas of potential future breeding merlin habitat.
- 1.1.15.15 Loss of foraging habitat during construction and dismantling works is considered to be negligible and temporary. A temporary loss of foraging habitat would result from the construction of access tracks for construction of the proposed 400kV transmission line and dismantling of the existing 132kV line, and from minimal felling of trees where access tracks pass through existing plantation woodland (although the use of these areas by prey species such as meadow pipit would not actually be precluded). However, as discussed at 1.1.14.7, habitat loss would be minimised. The extent of heather-dominated moorland that would be lost or damaged is considered to represent a negligible loss of hunting habitat for birds in relation to the area of available habitat and given this would be only a very limited area compared to their home range.
- 1.1.15.16 No breeding sites would be directly affected. Potential effects relating to disturbance would be mitigated during the construction of the proposed 400kV line and dismantling of the existing 132kV line to ensure no disturbance to merlin during the breeding season. This would be achieved by ensuring that exclusion areas are enforced which would restrict any works during the construction and dismantling phases.
- 1.1.15.17 Consideration has also been given to the potential displacement and barrier effects associated with the 400kV transmission line as a new man-made structure in or close to the SPA. No material displacement effects as a result of the construction of the proposed 400kV transmission line are predicted, given that merlin have been seen actively hunting in close proximity to the existing 132kV transmission line in the Drumochter Hills and flights have been recorded over this transmission line in the Drumochter Hills during the fieldwork for this Special Study.
- 1.1.15.18 In terms of potential displacement of nest sites, the proximity of the nest site identified during survey work in 2006 (less than 500m from the proposed 400kV line and approximately 500m from the existing 132kV line) also suggests that merlin nesting sites are not displaced to any significant degree. The ES reported breeding and possible breeding of merlin at similar distances and closer distances from the existing powerline in a number of areas along the Beaulieu to Denny route providing further evidence that displacement effects in relation to breeding sites (at less than 500m from the proposed line) are also likely to be negligible.
- 1.1.15.19 Given the close proximity of the infrastructural corridor to the Drumochter Hills SPA (including the existing 132kV transmission line to be replaced, the A9 trunk road and the Perth to Inverness mainline railway) it is considered that the construction of the proposed 400kV line will not present a barrier effect materially different from the existing baseline.
- 1.1.15.20 Therefore, it is concluded that the proposed project would not affect maintenance in the long-term of the distribution of merlin within the Drumochter Hills SPA.

Distribution and extent of habitats supporting the species

- 1.1.15.21 Consideration has been given to any potential effects that could adversely impact on the distribution and extent of habitats supporting merlin in the Drumochter Hills SPA.

- 1.1.15.22 The project would not result in any direct loss of nest sites for merlin. Loss of foraging habitat due to the construction of the proposed 400kV line is considered to be negligible, and will be partially off-set by the dismantling of the existing 132kV line (both within and outwith the SPA).
- 1.1.15.23 A temporary loss of foraging habitat would result from the construction of access tracks for construction of the proposed 400kV transmission line and dismantling of the existing 132kV line. However, as discussed at 1.1.14.7, habitat loss would be minimised. The extent of heather-dominated moorland that would be lost or damaged is considered to represent a negligible loss of hunting habitat for birds in relation to the area of available habitat and given this would be only a very limited area compared to their home range.
- 1.1.15.24 Therefore, it is concluded that the proposed project would not affect the maintenance in the long-term of the distribution and extent of habitats supporting merlin within the Drumochter Hills SPA.

Structure, function and supporting processes of habitats supporting the species

- 1.1.15.25 The potential for the proposed project to prevent the maintenance in the long-term of the structure, function and supporting processes of habitats supporting the Drumochter Hills SPA merlin population is considered to be very limited.
- 1.1.15.26 Breeding habitat (i.e. nesting opportunities and existing nesting areas) would not be directly affected by the project, and mitigation would ensure that there is no disturbance during the breeding season. As discussed above, the nearest merlin nest site is less than 500m from the proposed 400kV line. The potential for the 400kV line to affect the function of breeding or nesting habitat (or commuting routes to and from these) through displacement or barrier effects is considered to be minimal. In terms of effects on foraging habitat, any impacts are considered to be temporary and of very limited extent, given the large home range of merlin and the alternative available habitat.
- 1.1.15.27 As discussed in paragraph 1.1.15.10 above, merlin collision with transmission lines such as the proposed 400kV line is considered to represent a low level of risk. The modelling predicts that the existing baseline collision rate for the 132kV line is very similar to the predicted collision rate of the proposed 400kV line. Given the accepted limitations of collision modelling, the effect of replacing the existing overhead transmission line with the proposed 400kV line is therefore predicted to be neutral.
- 1.1.15.28 Therefore, it is concluded that the proposed project would not affect the maintenance in the long term of the structure, function and supporting processes of habitats supporting merlin within the Drumochter Hills SPA.

No significant disturbance of the species

- 1.1.15.29 Disturbance effects (due to increased human activity and vehicle access) during construction, operation and dismantling phases of the proposed 400kV line and dismantling of the existing 132kV line have been carefully considered and appropriate mitigation provided in order to reduce such temporary disturbance to a level that would have no impact on the SPA.
- 1.1.15.30 Therefore, it is concluded that the proposed project would have no significant disturbance impacts that may affect in the long term the maintenance of the Drumochter Hills SPA merlin population.

Conclusions

- 1.1.15.31 The proposed project is assessed as having negligible impact and minor significance overall for the current (2006) merlin population within the Drumochter Hills SPA (see Table 6).
- 1.1.15.32 Summer flight activity surveys undertaken in 2006 confirmed the presence of a breeding pair of merlin within 500m of the proposed and existing transmission lines. However, the volume of flights that actually crossed or passed within 100m of either the proposed or existing lines was low in 2006 and very low in 2004, with no flights recorded as crossing either proposed or existing line in 2005.
- 1.1.15.33 Given the low level of merlin activity, along with the level of committed mitigation by SHETL, it is considered that no phase of the project would significantly impact on merlin in terms of population size or distribution. Similarly the proposed project is predicted not to have

significant impacts upon the distribution, extent, structure, function or supporting processes of the habitats supporting merlin within the SPA, as examined within this Special Study. Potential impacts on dotterel have been excluded due to their montane habitat requirement, resulting in no spatial overlap with the proposed project. It is considered that the qualifying species would not be significantly disturbed by any phase of the project.

- 1.1.15.34 All impact magnitudes are assessed as none to negligible, and all assessments of effect significance are none to minor (see Table 6). The route of the proposed 400kV line is evaluated as being associated with a similar collision risk to the existing 132kV line. There would be no combined collision risk effect of both lines being in place at the same time. Therefore it is considered that the predicted collision risk associated with the proposed project would not adversely affect the integrity of the SPA.
- 1.1.15.35 Analysis of the conservation objectives of the SPA leads to the conclusion that the proposed Beaulieu to Denny overhead transmission line project, will not adversely affect the integrity of the Drumochter Hills SPA.

Table 6: Summary Assessment of the Mitigated Project on the Drumochter Hills SPA

Potential Impact	Impact Magnitude	Impact Significance
Construction Phase		
Disturbance due to increased human activity and vehicular access	Negligible	Minor ¹⁸
Habitat loss or damage	Negligible	Minor
Operational Phase		
Disturbance due to increased human activity and vehicular access	Negligible	Minor
Habitat Loss or Damage	Negligible	None
Predation	Negligible	None
Displacement and barrier effects	Negligible	None
Displacement of prey	Negligible	None
Potential Bird Collisions with Wires (Conductors and Earth Wires) and/or Towers	Negligible	None
Electrocution risk	Negligible	None
Dismantling Phase - 132kV Line		
Disturbance due to increased human activity and vehicular access	Negligible	None
Habitat loss and/or damage	Negligible	Minor
Removal of Potential Collision Risk with Wires (Conductors and Earth	None	None

¹⁸ There is no category for Negligible impact significance given in table 22.17 of the Technical Annex to the ES. Therefore the significance of all impacts recorded in the ES as Negligible have been altered to read Minor and therefore correspond to the guideline criteria given in table 22.17.

Wires) and/or Towers		
Dismantling Phase – 400kV Line	To be assessed at the time of dismantling – likely to be similar to those assessed above for the 132kV line	
Overall Assessed Impact	Negligible	Minor

1.1.16 References

- **Alonso, J.A. & Alonso, J.C. (1999)** Collision of Birds with Overhead Transmission Lines in Spain. In: *Birds and Powerlines* M. Ferrer & G.F.E. Janss (eds.), Quercus, Madrid, Spain.
- **Avian Power Line Interaction Committee (APLIC) (1994).** *Mitigating Bird Collisions with Powerlines: The State of the Art in 1994*. Edison Electric Institute. Washington, D.C.
- **Becker, D.M., Sieg C.H. 1987.** Home range and utilisation of breeding male merlins, *Falco columbarius*, in southeastern Montana, Canadian Field-Naturalist, **101**: 398-403.
- **Bevanger, K. 1994.** Bird interactions with utility structures: collision and electrocution, causes and mitigating measures. IBIS 136:412–425.
- **Bibby, C.J. 1986.** Merlins in Wales: site occupancy and breeding in relation to vegetation, Journal of Applied Ecology, **23**: 1-12.
- **Bibby, C.J., Natrass M. 1986.** Breeding status of the merlin in Britain. British Birds **79**: 170-185.
- **Bibby, C.J. 1987.** Foods of breeding Merlins *Falco columbarius* in Wales. Bird Study, **34**: 64-70.
- **Brown, A.F., & Shepherd K.B. 1993.** A method for censusing upland breeding waders. Bird Study **40**: 189-195.
- **Cooper, B., & Gallacher, J. 2004.** *Site Condition Monitoring of Aggregation of Breeding Merlin (Falco Columbarius) within the Drumochter Hills SPA/SSSI*. A report by Tilhill Forestry Ltd. for Scottish Natural Heritage.
- **Cramp S., Simmons K.E.L., Gillmor R., Hollom P.A.D., Hudson R., Nicholson E.M., Ogilvie M.A., Olney P.J.S., Roselaar K.H., Voous K.H., Wallace D.I.M. & Wattel, J. (1980).** Handbook of the Birds of Europe, the Middle East and North Africa: The Birds of the Western Palearctic – Volume 2, Hawks to Bustards.
- **Crick, H.Q.P. 1993.** Trends in breeding success of Merlins (*Falco columbarius*) in Britain from 1937-1989. In Nicholls M.K. & Clarke R. (eds.) *Biology and Conservation of Small Falcons*: 30-38. Hawk & Owl Trust, London.
- **DETR. 2000.** Report of the UK Raptor Working Group, DETR, London.
- **Fielding A.H. & Haworth P.F. 2003.** Recovery of the South Pennine Merlin (*Falco columbarius*) population. In: Thompson, D.B.A, Redpath S.M., Fielding A.H., Marquiss M. & Galbraith C.A. *Birds of Prey in a Changing Environment*, Scottish Natural Heritage, Edinburgh. 201-208.
- **Gibbons, D.W., Reid J.B. & Chapman, R.A. 1993.** *The New Atlas of Breeding Birds in Britain and Ireland: 1988-1991*, T & AD Poyser, London.
- **Gilbert, G., Gibbons, D.W. & Evans, J., 1998.** *Bird Monitoring Methods*, RSPB, Sandy.
- **Marsden, A., Rebecca, G.W. & Parkin, D.T. 2003.** A non-invasive technique for monitoring raptor populations using genetic profiling: a case study using merlin (*Falco columbarius*). In: Thompson, D.B.A, Redpath, S.M., Fielding, A.H., Marquiss, M. & Galbraith, C.A. *Birds of Prey in a Changing Environment*, Scottish Natural Heritage, Edinburgh. 209-213.
- **Meek, E.R. 1988.** The breeding ecology and decline of the merlin *Falco columbarius* in Orkney. Bird Study **35**: 209-218.
- **Parr, S.J. 1994.** Changes in the population size and nest sites of Merlin *Falco columbarius* in Wales between 1970 and 1991, Bird Study, **41**: 42-47.
- **Ratcliffe, D.A. 1990.** *Bird Life of Mountain and Upland*. Cambridge University Press, Cambridge.
- **Rebecca, G.W. & Cosnette, B.L. 2003.** Long-term monitoring of breeding merlin (*Falco columbarius*) in Aberdeenshire, north-east Scotland 1980-2000. In: Thompson, D.B.A,

Redpath, S.M., Fielding, A.H., Marquiss, M. & Galbraith, C.A. Birds of Prey in a Changing Environment, Scottish Natural Heritage, Edinburgh. 183-199.

- **Rebecca, G.W. & Bainbridge, I.P. 1998.** Breeding status of the Merlin *Falco columbarius* in Britain 1993-1994, *Bird Study* **45**: 172-187.
- **Rebecca, G.W., Cosnette, B.L., Duncan, A., Picozzi, N. & Catt, D.C. 1990.** Hunting distance of breeding merlins in Grampian indicated by ringed wader chicks taken as prey, *Scottish Birds*, **16** (1): 38-39.
- **Schempf, P.F. 1989.** *The Raptor*, **1**: 22-24.
- **Scottish Natural Heritage. 2005.** Survey methods for use in assessing the impacts of onshore windfarms on bird communities (Appendix 1: Method statement for vantage point watches).
- **Scott, R.E., Roberts, L.J. & Cadbury, C.J. (1972).** Bird deaths from powerlines at Dungeness. *British Birds* **65**:273-286.

1.1.17 Appendix I: Target notes relating to potential merlin habitat within the survey corridor of the Drumochter Hills SPA

Target Note Number	OS square	eastings	northings	Location	Study area	Description of habitat
1	NN	63808	82812	Drochaid a' Bhacain S of Dalwhinnie to North Drumochter Lodge	Drumochter	No crow nests within this plantation strip, no crows observed (probably due to heavy keeping effort)
2	NN	64034	82575	Plantation strip just south of Dalwhinnie	Drumochter	Shelterbelt slightly more mature than other strips to N and S, potentially more suitable for crow (& therefore merlin) nest sites. Trees c. 5-7m high.
3	NN	64517	82105	Allt Coire nan Cisteachan - nr track leading up mountainside just S of Wade Bridge nr Dalwhinnie	Drumochter	Burn with shallow heather providing suboptimal habitat for merlin.
4	NN	63505	81576	NOT IN SPA. Far side of railway along west side of A9 between plantation at Wade Bridge and North Drumochter Lodge.	Drumochter	Patches of scrub/small trees along back of railway line. Merlin was sighted on fence post along this stretch during May VP. No further signs seen during breeding bird surveys.
5	NN	64305	81186	Allt Coire Bhohe, burn between North Drumochter Lodge and Wade Bridge	Drumochter	Steep sided burn with scattered trees and fairly deep unburnt heather. Provides good habitat for merlin, although no merlin signs were seen.
6	NN	63300	80379	Plantation strip along roadside north of North Drumochter Lodge	Drumochter	Shelterbelt along existing transmission line with conifers 4-5m high and overgrown heather. No signs of crow nests or merlin. [* barn owl pellet found here in hollowed out top of deer fence post during early September '04).
7	NN	63989	79790	Small plantation stand on opposite side of road from North Drumochter Lodge	Drumochter	No crow nests were located within this plantation strip, no merlin signs.
8	NN	63280	79300	Allt Coire Dubhaig south of North Drumochter Lodge.	Drumochter	Several scattered birch trees growing up the streamside with deep, overgrown heather. Sheltered. No crow nests in trees. No merlin signs seen, although the pathways around the back of North Drumochter Lodge are degraded and obviously used quite frequently by vehicles - disturbance may discourage breeding merlin.
9	NN	62486	79181	Gulley south of Balsporran Cottages	Drumochter	Steep sheltered gulley; deep heather with a burn running along the bottom of the gulley. Provides good potential habitat for nesting merlin but no signs seen.

10	NN	62956	79016	S of North Drumochter Lodge	Drumochter	Plucking post found with fresh blood.
11	NN	62890	78156	Area between North Drumochter Lodge and mobile phone mast.	Drumochter	Fairly homogeneous stands of heather moorland managed by muir burn. Heath height mainly 30-45cm in unburnt areas and therefore suboptimal for nesting merlin. Numerous small burns within heather.
12	NN	62737	78044	Burn to N of Creagan Doire Dhonaich (S of North Drumochter Lodge)	Drumochter	Dry gully with fairly deep heather on both sides providing potential habitat for merlin. No merlin signs.
13	NN	63558	76423	Gully between Waterfalls and Creagan Doire Dhonaich	Drumochter	Gully with deep heather growing on either side providing good, sheltered or undisturbed merlin habitat. No merlin signs.
14	NN	63604	75636	Waterfalls (Allt a' Chaorainn) just N of Creag nan Ubhal	Drumochter	Steep sided, sheltered gully with deep heather on either side and fairly fast flowing burn at base opening to a small waterfall at the base of the hill. A merlin was sighted flying up the burn but no signs were found of a nest. This route is used by walkers to access the mountains summit (three groups encountered during survey) and beyond so disturbance may be reasonably high during the spring and summer.
15	NN	64391	74419	Moorland to N of Dalnaspidal Lodge	Drumochter	Dry heather moorland
16	NN	64854	74009	Burn to N of Dalnaspidal Lodge	Drumochter	Rocky and steep gorge with trees in sheltered positions. Some bracken stands. Heather grazed and shallow, suboptimal for merlin.
17	NN	64365	73559	Plantation just north of Dalnaspidal Lodge	Drumochter	Conifer plantation with no located crow nests. No merlin signs
18	NN	64060	73327	Wetlands to W/NW of Dalnaspidal Lodge	Drumochter	Flooded wetland with grassy islands.
19	NN	63100	73200	Plantation strip by road to the south of the county boundary	Drumochter	Immature conifer plantation (10-15yrs), no crow nests located, no merlin signs.

Annex 10**Appendix II - Table 1: Number of flights per hour crossing either the proposed or passed within 100m of the proposed 400kV line or the existing 132kV line in relation to 250m sections**

2004					
132Kv					
250m Section	flight Number	No of birds	Collision Height	Corrected Hours Watched	Birds/hour (all heights)
442	3715	1	Y	30.00	0.033
400kV					
250m Section	flight Number	No of birds	Collision Height	Corrected Hours Watched	Birds/hour (all heights)
S313	3715	1	Y	30	0.033
2006					
132kV					
250m Section	Flight Number	No of birds	Collision Height	Corrected Hours Watched	Birds/hour (all heights)
445	15	1	N	57.17	0.017
445	33	1	Y	57.17	0.017
443	34	1	Y	40.25	0.025
439	40	1	Y	33.00	0.030
400kV					
250m Section	Flight Number	No of birds	Collision Height	Corrected Hours Watched	Birds/hour (all heights)
S324	3	1	N	33.00	0.030
S316	15	1	Y	33.00	0.030
S316	33	1	Y	33.00	0.030
S315	34	1	Y	33.00	0.030
S311	40	1	Y	33.00	0.030