

Appendix 8.1 Ornithology Technical Appendix

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Appendix 8.1 Ornithology Technical Appendix

Introduction

This report presents the ornithological survey work undertaken at the proposed wind farm site at Sandy Knowe (“the Proposed Development”) by WSP Environment and Energy (E&E) Ltd from April 2011 to July 2012.

The Proposed Development is 319 ha in size and is located in Dumfries and Galloway at NS 619 166. The Proposed Development site is located approximately 6.5 km east of New Cumnock and 1.7 km south-west of Kirkconnel and comprises largely of grassland and rough moorland habitat with a small section of woodland present in the east. The Polmeur Burn flows from the centre of the eastern area, in a northerly direction into the River Nith, situated approximately 1.2 km to the north. The elevation of the Proposed Development site ranges from approximately 240 m to 445 m AOD. The site is bound by woodland to the west, a mixture of moorland and woodland to the south; and agricultural land to the north and east. The wider area to the west, south and east is principally open moorland interspersed with small areas of surviving ancient, semi natural and commercial woodland. Hare Hill Wind Farm (comprising 20 turbines) is situated approximately 1.6 km to the east of the site.

Proposal

Proposals comprise the construction of 24 2MW turbines and associated infrastructure within on the Proposed Development site.

Objective

The objectives of study were to:

- map the distributions of breeding birds, including scarce species listed in Annex 1 of the EU Birds Directive (79/409/EEC) on the Conservation of Wild Birds 1979 (the Birds Directive) or Schedule 1 of the Wildlife and Countryside Act 1981 (WCA);
- quantify the level of bird flight activity by breeding, foraging and migratory birds of potential conservation importance; and
- record the presence and abundance of other birds of conservation importance (those listed in Biodiversity Action Plans (BAP) or on the Red list of Birds of Conservation Concern (Eaton et al., 2009) throughout the 12-month survey period.

Consultation and Desk Study

Consultation

Scoping to inform the requirements of an Environmental Impact Assessment (EIA) was undertaken in November 2011. The response from the Royal Society for the Protection of Birds (RSPB) stated that the main issue regarding the Proposed Development would concern impacts to black grouse (*Tetrao tetrix*), and noted there were several leks within the Proposed Development site. The society further noted that that the Forest Commission for Scotland had bought a large area of land adjacent to the Proposed Development site (Corserig) in order to create a community woodland and significantly enhance black grouse habitat and suggested that any proposal would need to demonstrate that it would conserve and enhance habitat for black grouse.

The RSPB additionally noted that the Proposed Development site would be of low-moderate value for hen harrier (*Circus cyaneus*) and peregrine (*Falco peregrinus*) in winter, and that merlin (*Falco columbarius*) breed on the forest edge a few kilometres to the southwest and may forage over this area throughout the year. The

response however noted that the nearest breeding peregrines are approximately 10 km from the Proposed Development site. Additional information was provided in respect to golden plover (*Pluvialis apricaria*), noting that large numbers have previously been found to use the Proposed Development site in winter and that the species breed at nearby Hare Hill and gather in the Proposed Development site in large numbers in late summer/autumn.

Dumfries and Galloway Raptor Study Group was consulted regarding the Proposed Development. The group confirmed the absence of any rare raptor breeding sites within 2 km of the Proposed Development site.

Desk Study

A search of publicly available mapping resources identified the presence of Muirkirk & North Lowther Uplands Special Protection Area (SPA) located approximately 5.2 km to the north of the Proposed Development site. The SPA is designated for its breeding population of hen harrier (harrier (6 % of the Great Britain population), short-eared owl (*Asio flammeus*) (3 % of the Great Britain population), merlin (merlin (0.7 % of the Great Britain population), peregrine (peregrine (0.5 % of the Great Britain population) and golden plover (0.7 % of the Great Britain population), and non-breeding population of hen harrier (2 % of the Great Britain population). The SPA is additionally listed as an Important Bird Area (IBA) by Birdlife International. A second IBA was recorded 6.4 km to the north of the site (Airds Moss & Muirkirk Uplands IBA) which is listed for its remaining continuous block of un-forested moorland in south-west Scotland.

A search of NBN Gateway of the 10 km Grid Square NS61 highlighted the potential presence of 15 Wildlife and Countryside Act Schedule 1 species, in addition to bird species listed on the JNCC Red List, Scottish Biodiversity List and UK BAP, these included: barn owl (*Tyto alba*), brambling (*Fringilla montifringilla*), fieldfare (*Turdus pilaris*), hen harrier, merlin, peregrine falcon, redwing (*Turdus iliacus*), common crossbill (*Loxia curvirostra*), goldeneye (*Bucephala clangula*), scaup (*Aythya marila*), corncrake (*Crex crex*), whooper swan (*Cygnus cygnus*), pintail (*Anas acuta*), long-tailed duck (*Clangula hyemalis*) and snow bunting (*Plectrophenax nivalis*).

Field Survey Methods

Consultation

The scope of the ornithology assessment (including field survey methods, Vantage Point (VP) locations and Viewsheds (VS)) was discussed with Blair Urquhart of Scottish Natural Heritage (SNH) between April and June 2011. Following these discussions, original VP locations VP2 and VP3 were moved outside the boundary of the Proposed Development site. No further changes were made to the other three VPs or proposed methods with exception of the breeding walkover surveys, where SNH requested that four survey repetitions were undertaken in comparison to two to three survey repetitions suggested in published guidance (SNH, 2010).

Habitat Mapping

Habitats within the site and surrounding area were evaluated and classified according to their value for bird species. The classification was based on the cover-type and structure of the vegetation and used information obtained from publicly available resources which was augmented with supplemental site visits to provide greater data resolution where required. Habitats were placed into one of the following categories, including: heath/bog (noting where recorded, stands of tall heather), grass moor, grass pastures (improved/recently improved/neglected) and plantation woodland (pre-thicket, closed canopy and/or clear fell).

Flight Activity

Consultation with SNH and the RSPB combined with the results of the data search identified that VP surveys would be required for diurnal raptors and woodland species. However, it should be noted that VP survey requirements for woodland species were satisfied by the survey requirements for diurnal raptors.

Five vantage points for were established using GIS combined with ordinance digital data outside the proposed site allowing VS coverage of approximately 65 % of the site at ground level and 94 % VS coverage of the site at 36 m above ground level (Table 1).

The five VPs used for diurnal VP surveys were:

- VP1 NS 69300 09376 Bearing 45o NE
- VP2 NS 68115 10842 Bearing 90o E
- VP3 NS 70999 09355 Bearing 315o NW
- VP4 NS 70014 10996 Bearing 180o S
- VP5 NS 68485 11377 Bearing 112o SE

Information on bird flight activity was collected during timed watches from VPs using the methods outlined in SNH (2010). Surveys started in April 2011 and continued through until the end of March 2012. An additional six hours of VP effort was carried out on VPs 2 and 3 to accommodate changes made to the location of these VPs in April 2011. Surveyors undertook the surveys in such a way as to minimise the impact on bird behaviour associated with their presence near the site.

For diurnal raptors and woodland species, watches were stratified across three daylight periods (termed 'early', 'middle' and 'late') to allow for diurnal variation in activity rates. All surveys were undertaken by a single observer in a wide range of weather conditions, but mainly in conditions of good ground visibility (> 2 km).

The timing of watches within each survey season was adjusted to account for changes in sunrise and sunset times (Annex 1). In total, 36 hours of observation were undertaken during the breeding period (April to August 2011; approximately six hours per month), with 36 hours to be undertaken during the non-breeding period (October 2011 to March 2012; approximately six hours per month) for diurnal raptors (Table 2, Annex 2a).

During each VP watch, two methods of recording were used; focal sampling of target species and activity summaries of secondary species. Observations were recorded against four band heights assuming a turbine hub height of 80 m and 45 m long blades. Height bands included: <10 m, 11-35 m, 36-126 m and 126+ m

Data were entered in the field onto recording sheets and later transferred to an Excel spreadsheet for analysis. Maps of flight activity by target species were compiled for each watch. Summary maps were compiled for each species at the end of the season.

Migratory Movements

Only six flights of migratory waterfowl consisting in total of 181 pink-footed geese (*Anser brachyrhynchus*) and three unidentified individuals were recorded during the sum of all ornithology surveys undertaken on site. Following discussion of these limited flights with SNH it was agreed that specific wintering and migratory waterfowl surveys were not required.

Breeding Walkover Survey

The Brown and Shepherd (B&S) method of census for upland breeding wader populations was used to survey the proposed development site and wider area for breeding birds (Gilbert *et al.*, 1998). Surveys were undertaken of the open ground areas within the Proposed Development and a 500 m study area between Mid-March and August 2011 in line with methods detailed by Gilbert *et al.*, (1998). These surveys focused on identifying approximate numbers of breeding pairs for each target species including Birds Directive Annex 1, WCA Schedule 1, Red List and/or UK/local Biodiversity Action Plan species. Although it is recognised that optimal surveys period is April to July, survey continued into August 2011 due to the late start to the bird season in early 2011 and poor weather conditions during July 2011.

The standard method for the B&S survey involves two complete mapping visits during the breeding season to allow for differences in detection rates between early and late breeding species. However, as previously outlined, 4 four surveys were undertaken. Surveys are usually conducted between 08:30 and 18:00 hours for waders, to avoid the main periods of rapidly changing bird activity. However, by modifying the method to include the hours between an hour after dawn and 12.00 hours, passerines (perching and singing birds) can be included within a survey. Meadow pipits (*Anthus pratensis*) are generally the exception as densities are often too great to be quickly and accurately estimated (SNH, 2010). This modified approach was used during the four survey visits to include passerine species. The area surveyed was subdivided into 500 m² areas. All points within these areas were approached to within 100 m, using a constant search effort, where birds were recorded systematically for 20-25 minutes in each of these areas. Survey routes generally followed raised ground in order to maximise ground visibility. Rivers and streams were investigated closely. The surveyor paused at regular intervals to scan and listen for calling and singing birds.

When individuals or pairs of birds were encountered, the fieldworker determined whether the bird(s) were different from any previously encountered. This involved careful attention to the whereabouts and movements of birds, together with birds' sex and plumage characteristics. To minimise the risk of double counting, behaviour and location of birds were carefully observed so that previously encountered birds were not recorded twice. Surveys were not conducted in winds greater than Beaufort Force 5, in persistent rain or when visibility was poor.

The following behaviour or signs were considered to represent breeding birds:

- displaying or singing;
- territorial dispute;
- repeated alarm calling or distraction displays;
- occupied nests;
- adult(s) carrying food;
- adult(s) carrying nest material; and
- newly fledged young with parent(s).

Other records were considered to be of non-breeding birds, failed breeders or birds loafing, feeding or on passage to other areas.

The location and activities of all bird species were recorded on 1:25 000 scale Ordnance Survey maps using standard British Trust for Ornithology (BTO) codes (Marchant, 1983). A species list and breeding population estimates were derived from the four survey visit maps. Where birds were recorded on more than one survey visit and considered to represent the same bird(s), the location recorded was taken as equidistant from each mapped observation.

Breeding Raptor Surveys

Due to the absence of frequent movements of raptor species recorded as part of the diurnal raptor VP surveys, coupled with the results of consultation within Dumfries and Galloway Raptor Group, a breeding raptor survey was not undertaken within and up to 2 km of the Proposed Development site in 2011. However, two male hen harriers and an individual merlin were recorded within the Proposed Development in late summer/early autumn 2011. Following these observation consultation was undertaken with SNH and it was agreed that a full breeding raptor survey was required. These surveys were undertaken between February and July 2012 inclusive, following guidelines presented in Hardy *et al.*, (2009).

Winter Walkover Survey

A winter walkover survey was carried out between October 2011 and March 2012 to identify winter roosting and foraging bird populations within the Proposed Development site and a 500 m of study area. The surveys were carried out in line with methods detailed in Gilbert *et al.*, (1998), and consisted of three visits during this period. As with the breeding walkover bird surveys, the winter walkover survey focused on identifying the presence and/or absence for each target species including Birds Directive Annex 1, WCA Schedule 1, Red List and/or UK/local Biodiversity Action Plan species.

Black Grouse

It was not possible to undertake dedicated surveys for black grouse in 2011 as observations of the species were first recorded after the end of the seasonal black grouse survey period. However, surveys to determine the presence of black grouse leks were undertaken between April and May 2012, inclusive following methods outlined in Gilbert *et al.*, (1998). All suitable areas of habitat within the Proposed Development in addition to a 1.5 km study area extending from its boundary were surveyed. Where leks were identified the location was recorded and a dawn count of lekking males undertaken on a subsequent visit.

Moorland Breeding Birds

Methods for the survey of moorland breeding birds are outlined above.

Woodland Birds

Woodland point count surveys were undertaken to determine the assemblage of breeding woodland bird species present within and adjacent to the proposed development site following methods detailed in Bibby *et al.*, (2000). As far as practicable, sample points were established at least 200 m apart and 100 m within areas of woodland that could not be surveyed by the breeding walkover survey detailed above.

Three survey visits were undertaken during the breeding season to allow for differences in detection rates between early and late breeding species. The first survey was undertaken in early May 2011 and the second survey was carried out in early June 2011, with the third survey carried out in early July 2011. Woodland point count surveys were repeated twice over the winter period alongside the winter walkover effort in areas of open habitat.

A total of eight points were sampled in planted coniferous woodland within and adjacent to the proposed development site. On arrival at the survey points, the surveyor waited for five minutes before beginning the timed count, to allow the birds to settle from the disturbance caused by moving through the woodland. During the initial settling period at each point, habitat features, grid reference, weather conditions etc. were noted.

Following the settling period, the surveyor listened and watched for all birds for a five minute period, and recorded them on a circular plot field sheet, including details on direction of flight, estimated distance of observation and behaviour/activity. The location and activity of birds was recorded using standard BTO codes (Marchant, 1983). Birds flying over the area but not landing in the observation area were not recorded.

Field Survey Results

Habitat Mapping

The Proposed Development site comprises a large un-fragmented area of mire habitat and grassland, with blanket bog being the most extensive mire habitat present. Large areas of this habitat type were recorded in the White Knowe area to the south east of the site between the Polneul Burn and the close-canopy plantation coniferous woodland. Other extensive areas of blanket bog were recorded between the Macan's Burn and the site boundary in the west and on top of White Hill. The most frequent grassland type recorded was marshy

grassland. The extent of this habitat was found in the west of the site between the burns and ditches feeding the Polneul Burn and in the flatter areas surrounding the Polmeur Burn.

Wildfowl and Gulls

Occurrence and Status

No species of wildfowl of conservation interest were recorded flying across the Proposed Development site and study area during breeding season VP watches carried out in 2011. However, during winter season VP watches pink-footed goose were noted.

Two species of gull were recorded during VP watches: lesser black-backed gull (*Larus fuscus*) and herring gull (*Larus argentatus*). A third species of gull: common gull (*Larus canus*) was observed during winter walkover surveys. Herring gull is a red-listed species of conservation concern and lesser black-backed gull and common gull are amber-listed species (Eaton *et al*, 2009) (Table 6 & 7).

Although not picked up during VP watches, mallard (*Anas platyrhynchos*), teal (*Anas crecca*) and goldeneye (all amber listed species of conservation concern) were recorded during the winter walkover surveys.

Abundance, Distribution and Flight Activity

Low numbers (one to four individuals) of lesser black-backed gull and herring gull were observed over the course of breeding and winter VP watches. Lesser black-backed gull (two individuals) and herring gull (four individuals) were observed flying through the study area buffer once during winter season VP watches (Height Band Two; 11-35m). A pair of herring gulls were observed crossing the study area during the winter walkover survey carried out in December 2011. A further two observations of gull species were made which, on account of distance from the observer and/or poor light, were not identified to species level. These observations were considered likely to be lesser black-backed gull or herring gull. Other observations of flight activity were typically recorded along the northern edge of the study area. A flock of thirty common gulls was recorded flying through the 500 m buffer to the north of the site during the winter walkover survey carried out in February 2012.

Four pink-footed goose flights were recorded across the study area on the 20th December 2011. A flock of 29 individuals and subsequent flocks of 51 individuals (twice) and 50 individuals were observed. The latter record of 50 birds was given as an approximation; and, given that all three of these flights were recorded within two or three minutes of each other, it is considered likely that all three flights were made by one single flock of 51 birds.

A flock of 29 birds was observed flying north-east across the study area over Mynwhirr Hill and the Libry Moor Plantation; the majority of this flight occurred at Potential Collision Height (PCH) (Height Band Three; [36-125 m]) although a smaller proportion of this flight occurred at Height Band Four (flights at 126 m or above). A flock of 51 birds was observed flying west and then south-west across the study area over Hunter's Hill, White Knowe and White Hill at HB3. Two further flights were recorded: a flock of 50 birds (given as an approximation) flying north-west across the study area above Hunter's Hill and Nether Cairn Farm and 51 birds flying south over White Hill. Both flights observed occurred exclusively at HB3.

Scare Raptors and Owls

Occurrence and Status

Four species of scarce raptor and owl were recorded during the vantage point surveys: hen harrier, peregrine, merlin, and long-eared owl (*Asio otus*) (Tables 7 & 10). Hen harrier, peregrine and merlin, are all listed on Schedule 1 of the Wildlife and Countryside Act (1981) as amended and are also listed on Annex 1 of the Birds Directive. Hen harrier is a red list species of conservation concern while peregrine falcon and merlin are green and amber listed species respectively (Eaton *et al.*, 2009). The common raptor species, buzzard (*Buteo buteo*), kestrel (*Falco tinnunculus*) and sparrowhawk (*Accipiter nisus*) were also recorded throughout the VP surveys.

In addition, during breeding raptor surveys barn owl were identified within the wider study area. Barn owl are listed on Schedule 1 of the Wildlife and Countryside Act (1981) as amended and are an amber listed species (Eaton et al., 2009)

Abundance and Distribution

An incidental record of the presence of hen harrier was made during survey work in April en-route to the original location of VP2. As the sighting was made out with a VP survey period the details of flight duration and flight line location and direction were not noted. The surveyor however did record that the flight was within HB2. Four hen harrier flights were additionally observed from VP4 in August 2011. Further to this, a male harrier was observed flying west over the access road which marks the eastern site boundary. This observation was made while en route to the VP location and as such details of flight duration and flight line location and direction were not noted. During these flights, a single male bird was observed hunting over the open moorland immediately to the east of Polneul burn. Two male birds were observed sitting close to one another on a fence line running roughly north-south through the centre of the study area. Both individuals were subsequently observed making flights east across the site over Libby Moor plantation.

Hen harrier activity at the site continued in the autumn; male harriers were observed from VPs 2, 3 and 4. On the 8th September 2011, nine flights were observed during dusk VP surveys. Two male birds were observed hunting over the site from VP3. The birds were observed together; flying in a westerly direction through the site over moorland to the north of White Knowe. A further eight flights were observed from VP4. The surveyor attributes these eight flights to two birds (G. Palmer, pers. comm.). On the 26th September 2011, a single male bird was observed sitting on a fencepost on the boundary of the Polnagrie Hill Pplantation. The bird was not observed departing the fence post but a male individual was observed hunting over White Hill a short time later. Two male hen harrier flights were recorded on the 31st October 2011. A single flight by a hunting male harrier was observed over White Knowe on the 11th November 2011.

Walkover surveys did not confirm the presence of breeding hen harrier within the Proposed Development site and wider study area although a 'ringtail' harrier and an adult male harrier were observed during raptor surveys carried out in April 2012. The ringtail was observed over Brunt Rig to the far south-east of the study area near the edge of the 2 km buffer. The adult male harrier was observed flying south-east out of the study area over the slopes of Mynwhirr Hill and on over Kello Water. Consultation with Dumfries and Galloway Raptor Study Group, as outlined above, identified no nest records within 2 km of the Proposed Development site. In addition, the surveys noted that the land to the north of the Proposed Development site was not suitable for this species.

A single peregrine observation was made on the 24th February 2012. A single individual was observed hunting over the 200 and 500 m buffers to the west of the site. No other observations of this species were made during breeding or wintering season surveys. An adult male peregrine was observed hunting over Gibbon's Hill in the south-west of the study area during the raptor survey carried out on the 27th July 2012.

Merlin was observed twice from VP locations over the non-breeding season. A female was observed sitting on a pylon on Polshag Hill before flying north into the site out of view. The second flight was also observed over Polshag Hill head heading north-westwards into the site. No other observations of this species were made.

A single barn owl was flushed, during the raptor survey carried out on the 24th April 2012, from a derelict livestock shed located adjacent to the junction off the main A76 road near Crockroy Cottage (NS 70615 12160) approximately 730 m from the site boundary.. A number of owl pellets were observed on the floor of the shed but there was no obvious sign of a nest. The shed was visited again in May 2012. The barn owl was not observed but fresh pellets and moulted barn owl feathers were recorded. An examination of the interior of the shed led the surveyor to conclude that there was no nest site within this building (J. Sweeney, pers. comm.).

A single long-eared owl was observed hunting low over the moorland in the north of the site on 29th July 2011.

Flight Activity from VPs – Breeding Season (April – August)

Four hen harrier flights were recorded during breeding season VP surveys. The total flight time was 435 seconds, all of which was recorded within HB1. As outlined above, one other recording of hen harrier flight was observed en route to original VP2 and as such flight activity was not available for this individual.

The single long-eared owl flight observed during the breeding season was recorded for 75 seconds and occurred entirely within HB1 (0-10 m).

Flight Activity from VPs – Non Breeding Season (October - March)

Thirteen hen harrier flights were recorded during winter season VP watches. The total flight time of these 13 flights was 1,335 seconds, all of which were recorded within HB1 (Table 11).

One peregrine flight was recorded during the winter season. The flight lasted 25 seconds; 15 seconds within HB2 (11-35 m) and the remaining 10 seconds observed within HB1.

Two merlin flights were recorded with a total flight time of 310 seconds, all of which was observed within HB1.

Black Grouse

Black grouse were observed throughout the period of ornithological study carried out at the study area. Activity was, in the main, centred on the east and north-east of the study area around the margins of Libry Moor Plantation, and on White Knowe and Hay Knowe.

Six flights involving seven individuals were recorded during the VP surveys totalling 260 seconds. Of this, 240 seconds were observed within HB1 and 20 seconds within HB2. On the 15th June 2011, a black cock was flushed from its resting site in the steep sided gorge of the Polmeur Burn while en-route to VP4. As the sighting was made out with a VP survey period the details of flight duration and flight line location and direction were not noted.

Black grouse were also recorded whilst carrying out breeding raptor and breeding bird field surveys within the study area. A bird was flushed eastwards into the edge of the young conifer plantation short distance to the south of Glengape approximately 2 km from the site boundary during raptor survey work on the 22nd April 2012. Additionally, a single black grouse male was observed during the final breeding walkover survey carried out on the 01st August 2011. The individual was located along the western edge of the Libry Moor Plantation resting in the long grass.

Specific black grouse surveys were carried out in March and April 2012 and identified two lek locations within the Proposed Development. On 29th March 2012, a single lekking male was observed on Hay Knowe, to the north-east of White Hill (NS 69514 10645). During a follow up survey undertaken on the 12th April 2012, a single male was observed lekking to the north of Hay Knowe on the west bank of the Polneul Burn (NS 69503 11894). The male remained at this lek site for the duration of the survey. A short time later, five females flew south east across site and landed at NS 70277 10164; close to the met mast. The surveyor searched the area around where the birds landed but they were not observed again.

Woodland Birds

Twenty-three species of woodland bird were recorded by the woodland surveys carried out during the breeding season. Of these, five species are red-listed species of conservation concern: cuckoo (*Cuculus canorus*), starling (*Sturnus vulgaris*), song thrush (*Turdus philomelos*), lesser redpoll (*Carduelis cabaret*), and spotted flycatcher (*Muscicapa striata*). These species are also listed as priority species on the UK Biodiversity Action Plan. Mistle thrush (*Turdus viscivorus*), dunnoek (*Prunella modularis*), bullfinch (*Pyrrhula pyrrhula*) and willow warbler (*Phylloscopus trochilus*) were additionally recorded and are amber listed species of conservation concern.

The spotted flycatcher observation was a single individual detected during the final raptor survey in July 2012. As this species was not recorded earlier in the breeding season during woodland surveys, this sighting is most likely related to post breeding dispersal activities.

The breeding bird assemblage of the plantation woodland within the study area is considered to be typical of young plantation forestry located within the southern uplands of Scotland.

Twelve species of woodland bird were recorded by the woodland surveys carried out during the non-breeding season. Of these, one species (song thrush) was a red listed species of conservation concern. In addition, two amber listed species were observed; dunnock and bullfinch. The breeding bird assemblage of the plantation woodland within the study area is considered to be typical of young plantation forestry located within the southern uplands of Scotland.

Waders

Occurrence and Status

Eight species of wader of conservation concern were recorded: dunlin (*Calidris alpina*), golden plover, lapwing (*Vanellus vanellus*), snipe (*Gallinago gallinago*), redshank (*Tringa totanus*), oystercatcher (*Haematopus ostralegus*), curlew (*Numenius arquata*) and woodcock (*Scolopax rusticola*) (Table 5 & 6). Golden plover and dunlin are listed on Annex 1 of the Birds Directive. Dunlin and lapwing are red listed species' of conservation concern; curlew, golden plover, snipe, redshank and oystercatcher are amber listed species of conservation concern (Eaton *et al.*, 2009).

Abundance, Distribution and Flight Activity

Ten golden plover flights were recorded across the study area over the course of the VP surveys. Activity was predominantly observed in the west of the study area over White Hill and Hay Knowe. Eight of these flights were recorded over two VP surveys carried out on the 21st April 2012. Two other flights were observed on the 26th September 2011 and the 23rd December 2011. A total flight time of 1135 seconds of flight activity was recorded across the study area involving a total of 170 individuals (Table 10). Four hundred and eighty seconds of flight was observed at HB3 and the remainder (655 seconds) occurred within HB1 and HB2. In addition, a flock of five golden plover were observed during the winter walkover survey carried out in October 2011. As this was not part of the VP surveys details of flight duration and flight line location and direction were not noted.

Two redshank flights were recorded across the study area. Both flights were observed in the west of the study area near White Hill and Hay Knowe. A total flight time of 65 seconds was recorded of which 20 seconds was observed at HB3. The remaining flight activity was observed below HB3.

Snipe have been recorded occasionally; an elusive feature within the Proposed Development site and wider study area. During a walkover surveys carried out during the breeding season the species was only observed once, in May 2011. The observation was made by a surveyor accessing the study area from the west through High Cairn Plantation. Snipe were picked recorded up during winter walkover surveys carried out over winter 2011/12. A single individual was flushed from moorland near the Libry Moor Plantation in October. A further two individuals were recorded in December and a total of six birds (four individuals and a brace) were observed across the study area in February 2012. Snipe have were occasionally been heard calling from the ground during VP surveys carried out along the western edge of the study area (VPs 2 and 5).

A flock of twenty-one dunlin was observed on White Hill during an initial walkover survey on the 11th March and again on the 30 March 2011.

A single oystercatcher was heard flying across the centre of the study area on the 15th June 2011 during a VP survey; the individual was not observed.

A flock of 40 lapwing were observed over open pasture located in Libry Moor Plantation in the far north-east of the study area during the first winter walkover survey.

Two probable pairs of curlew were recorded within the Proposed Development site and wider study. Singing and display activity was intense around the edge of Libry Moor Plantation during VP surveys carried out in mid-April but by the end of the month, this activity was notably reduced. Two territories were established, one on White Knowe and a second in the southwest corner of the study area near Polnagrie burn. A third territory around Hay Knowe was seemingly abandoned in late April/early May as flight activity in this section of the Proposed Development site and wider study area disappeared by May 2011. No nest sites were found by the surveys and it is considered doubtful that breeding was successful for either established pair as no young birds were observed in June or July 2011.

One woodcock was observed on the western edge of Libry Moor Plantation during the winter walkover survey carried out on the 28th December 2011.

Other Moorland Birds

Occurrence and Status

Other moorland species of conservation concern recorded during breeding walkover surveys included the red-listed skylark (*Alauda arvensis*), grasshopper warbler (*Locustella naevia*), linnet (*Carduelis cannabina*) and fieldfare and the amber listed reed bunting (*Emberiza schoeniclus*), meadow pipit, wheatear (*Oenanthe oenanthe*) and whinchat (*Saxicola rubetra*). Fieldfare is also listed on schedule 1 of the Wildlife and Countryside Act (1981) as amended.

A very large flock of fieldfares (estimated to be between 1,000 and 1,200 individuals) was observed flying west over Libry Moor Plantation on the evening of the 8th May 2011. Large numbers were seen again lingering around Libry Moor Plantation the following morning. Fieldfares were observed during all the winter walkover surveys carried out over winter 2011/12. The largest single flock recorded included 41 individuals but flocks of between 10 and 20 birds were more typical.

Abundance and Distribution

Five grasshopper warbler territories were identified (from singing males) within the study area. These territories were largely distributed around the margins of the Proposed Development site and wider study area.

Three reed bunting territories were identified, all from singing males. The territories were distributed over the northern half of the Proposed Development site and study area.

Two wheatear territories were identified in the north of the study area with breeding confirmed at both.

Two whinchat territories were confirmed within the Proposed Development site and study area. At one, located in the north-west of the study area, a male was observed carrying food. At a second located along the Polneul burn, a male-female pair was observed together.

References

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Tables

Table 1 – Areas visible from Vantage Points (VPs). Data are hectares, with a 2 km cut-off

VP	Grid reference	Area visible (2 km cut-off)
1	NO 69300 09376	145.94
2	NO 68115 10842	252.75
3	NO 70999 09355	137.13
4	NO 70014 10996	523.27
5	NO 68485 11377	288.47
Total		1347.56

Table 2 – Summary of monthly VP observations from 2011-12. Data are hours of observation. Three daylight periods were defined, for Early (E), Middle (M) and Late (L) watches (refer to Annex 1 for times of diurnal stratification)

VP	Watch	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
1	E	0	3	0	3	0	0	0	0	3	0	0	0
	M	3	6	0	6	3	6	3	3	0	3	3	3
	L	3	0	3	3	3	0	3	3	0	3	3	3
Total		6	9	3	12	6	6	6	6	3	6	6	6
2	E	0	3	0	0	3	0	0	0	3	2	3	2
	M	3	6	0	6	3	0	3	3	3	3	3	3
	L	3	0	3	0	0	0	0	0	0	2	2	0
Total		6	9	3	6	6	0	3	3	6	7	8	5
3	E	3	0	3	0	0	0	0	0	3	0	0	0
	M	3	6	0	6	3	0	3	3	3	3	3	3
	L	0	3	3	3	3	3	3	3	0	3	3	2
Total		6	9	6	9	6	3	6	6	6	6	6	5
4	E	3	3	0	3	0	0	0	0	3	0	0	0
	M	3	3	3	3	3	3	6	3	3	0	3	3
	L	0	3	3	3	3	3	0	3	0	0	3	3
Total		6	9	6	9	6	6	6	6	6	0	6	6
5	E	0	0	3	0	3	3	0	0	3	0	0	0
	M	6	6	3	3	3	3	3	0	3	0	3	0
	L	0	3	3	3	0	0	3	3	0	0	3	3

VP	Watch	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
Total		6	9	9	6	6	6	6	3	6	0	6	3
Grand Total		30	45	27	42	30	21	27	24	27	19	32	25

Table 3 – Details of search effort for evidence of breeding by scarce raptors and owls in 2012

Date	Observer	Time in field (hrs)
20/04/2012	J Sweeney	2
21/04/2012	J Sweeney	5.25
22/04/2012	J Sweeney	1.5
19/05/2012	J Sweeney	6.5
16/06/2012	J Sykes	6
27/06/2012	K Shaw	6.5

Table 4 – Details of searches for black grouse signs in Winter 2011/2012 and displaying black grouse in Spring 2012

Date	Time in field (hrs)	Area checked	Results
29/03/2012	4	Proposed Development plus 1.5km	1 lek comprising single male (NS 69514 10645)
12/04/2012	4	Proposed Development plus 1.5km	1 lek comprising single male (NS 69503 11894)

Table 5 – Autumn / winter transects 2011-2012. Count of species seen and total survey hours completed for each month

Month	Sept	Oct	Nov	Dec	Jan	Feb	Mar
Total Hours		7.5		7		8	
Count of species seen within each month							
Blackbird				4		5	
Blue tit						1	
<i>Bullfinch</i>				14		3	
Buzzard		4		1			

Month	Sept	Oct	Nov	Dec	Jan	Feb	Mar
Carrion crow		12				14	
Chaffinch		5		16		45	
Coal tit		4		16			
Common crossbill				4		46	
Common gull						1	
Duncock				2		2	
<i>Fieldfare</i>		83		63		42	
Goldcrest				6		5	
Golden plover		5					
Goldeneye		1					
Goosander				2		1	
Greater spotted woodpecker						1	
Grey heron		1		1		4	
<i>Herring gull</i>				2			
Jackdaw						70	
Jay		2					
Kestrel		2		1		1	
Lapwing		40					
Lesser redpoll				7		8	
Linnet		20					
Magpie		3					
Mallard				6		4	
Meadow pipit		1				3	
Mistle thrush		5		3		2	
Raven		100		4		3	
Reed bunting				7		12	

Month	Sept	Oct	Nov	Dec	Jan	Feb	Mar
Robin		1		14		2	
Rook				18		153	
Siskin		1		7			
Snipe				2		5	
<i>Song thrush</i>						8	
Sparrowhawk				1		1	
Starling		3		44		21	
Teal				2		1	
Treecreeper						1	
Wren				2		1	

Birds listed in Annex 1 of the Birds Directive or Schedule 1 of the WCA are shown in bold. Red-listed birds of Conservation Concern and Biodiversity Action Plan (BAP) species are shown in italics.

Table 6 – Species recorded during VP observations of flight activity 2011/2012

Species	Target	No. of 5 minute intervals	% Occurrence
Black grouse	T	17	0.41
Buzzard		39	0.93
Carrion crow		2	0.05
<i>Curlew</i>		39	0.93
Hen harrier	T	18	0.43
Herring gull		4	0.10
Golden plover	T	10	0.24
Goosander		1	0.02
Kestrel		7	0.17
Lesser black-backed gull		4	0.10
Long-eared owl	T	1	0.02
Oystercatcher		1	0.02
Merlin	T	3	0.07

Species	Target	No. of 5 minute intervals	% Occurrence
Peregrine falcon	T	1	0.02
Pink footed goose	T	4	0.10
Redshank		2	0.05
Raven		77	1.84
Sparrowhawk		7	0.17
Tawny owl		2	0.05

The number of 5-min recording periods in which each species was encountered during watches from all VPs (n=4188) is shown. T = Target Species. Birds listed in Annex 1 of the Birds Directive or Schedule 1 of the WCA are shown in bold. Red-listed birds of Conservation Concern and Biodiversity Action Plan (BAP) species are shown in italics.

Table 7 – Summary of flight activity and elevation by Target Species of high conservation concern recorded during VP watches in 2011-2012

Species	Date	VP	Total scan time* (hrs)	No. of flights	No. of birds	Total flying time (s)	<10m	11-35m	36 - 124m	> 125 m
Black grouse	21.04.2011	4	2.99	1	2	30	15	15	-	-
	21.04.2011	2	2.99	1	1	5	-	5	-	-
	21.04.2011	2	2.99	1	1	15	15	-	-	-
	08.09.2011	2	2.95	1	1	180	180	-	-	-
	16.09.2011	1	2.99	1	1	15	15	-	-	-
	21.10.2011	1	2.99	1	1	15	15	-	-	-
Hen harrier	09.08.2011	4	2.88	4	4	435	435	-	-	-
	08.09.2011	4	2.85	8	8	525	525	-	-	-
	08.09.2011	3	2.95	1	2	180	180	-	-	-
	26.09.2011	1	2.98	1	1	60	60	-	-	-
	31.10.2011	4	2.85	2	2	540	540	-	-	-
	11.11.2011	3	2.99	1	1	30	30	-	-	-
Golden plover	21.04.2012	2	2.98	1	23	75	-	-	75	-
	21.04.2012	2	2.99	1	1	25	-	25	-	-

Species	Date	VP	Total scan time* (hrs)	No. of flights	No. of birds	Total flying time (s)	<10m	11-35m	36 - 124m	> 125 m
	21.04.2012	2	2.96	1	14	130	45	85	-	-
	21.04.2012	2	2.93	1	14	280	55	75	150	-
	21.04.2012	2	2.99	1	2	35	15	20	-	-
	21.04.2012	2	2.93	1	2	240	30	165	45	-
	21.04.2012	2	2.94	1	53	210	-	-	210	-
	21.04.2012	2	2.99	1	29	50	15	35	-	-
	26.09.2011	2	2.99	1	12	30	-	30	-	-
	23.12.2011	5	2.97	1	20	120	-	120	-	-
Pink-footed goose	20.12.2011	1	2.97	1	51	120	-	-	120	-
	20.12.2011	3	2.97	1	29	120	-	-	90	30
	20.12.2011	3	2.95	1	50	160	-	-	160	-
	20.12.2011	4	2.93	1	51	240	-	-	240	-
Peregrine falcon	24.02.2012	2	2.99	1	1	25	-	15	10	-
Merlin	20.12.2011	3	2.99	1	1	10	10	-	-	-
Long eared owl	29.07.2011	4	2.98	1	1	75	75	-	-	-
<p>The number of flights, total bird flying time and time birds spent within various height categories. The effective observation time (scan time*) was calculated by subtracting the time for which a Target Species was recorded from the total time spent watching. Where sub-totals are shown the data are grouped according to breeding / non-breeding periods. Shaded flying heights are those within the approximate rotor swept height (RSH) of the proposed turbines.</p>										

Table 8 – The abundance of Birds of Conservation Concern (Red List and Biodiversity Action Plan (BAP)) species recorded during the 2011 breeding bird survey within the 500 m buffer of the Proposed Development (numbers in parentheses are those which fell within the 500 m survey boundary)

Species	Definite breeding (No. territories)	Likely breeding (No. territories)
Curlew	0	2
Grasshopper warbler	0	3
Reed bunting	0	3
Wheatear	2	0
Whinchat	2	0

Annexes

Annex	Title
1	Recording periods used in the diurnal stratification of VP watches
2a	Details of VP watch effort
2b	Meteorological conditions during VP watches
3	List of Target Species recorded during VP watches

Annex 1 - Recording periods used in the diurnal stratification of VP watches

	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Early finish by	1030	0830	0745	0830	0845	0730	1030	1100	1115	1145	0945	0930
Middle finish by	1700	1700	1700	1700	1700	1600	1500	1400	1515	1545	1430	1630
Late finish by	2000	2130	2200	2200	2045	2015	1915	1630	1630	1730	1830	2000

Annex 2a – Details of VP watch effort. Date and time of observations together with the observer (Obs), vantage point (VP), the start time, stratification (E = early, M = Middle, L = Late), the number of 5 minute periods in the watch and the number of 5 minute periods in which a target species was recorded

Year	Month	Day	Obs	VP	Start	EML	5 min periods	
							Total	Target sp.
2011	4	5	RF	1	13:30	M	18	
2011	4	20	RF	1	13:30	M	18	2
2011	4	20	RF	1	18:35	L	36	
2011	4	5	ER	2	13:30	M	18	
2011	4	20	ER	2	13:33	M	18	
2011	4	20	ER	2	18:36	L	36	1
2011	4	5	RF	3	09:00	M	36	3
2011	4	21	ER	3	05:50	E	36	13
2011	4	21	RF	4	05:50	E	36	5
2011	4	21	RF	4	11:15	M	36	3
2011	4	5	ER	5	09:05	M	36	2
2011	4	21	ER	5	11:05	M	36	

Year	Month	Day	Obs	VP	Start	EML	5 min periods	
							Total	Target sp.
2011	5	11	RF	1	09:00	M	36	
2011	5	12	ER	1	04:50	E	36	1
2011	5	31	ER	1	11:50	M	36	
2011	5	11	ER	2	06:45	E	36	
2011	5	12	ER	2	11:00	M	36	
2011	5	30	ER	2	13:00	M	36	
2011	5	09	RF	3	18:50	L	36	
2011	5	11	RF	3	12:30	M	36	
2011	5	30	RF	3	13:05	M	36	
2011	5	12	RF	4	05:00	E	36	3
2011	5	12	RF	4	10:45	M	36	
2011	5	30	RF	4	16:40	M	36	
2011	5	9	ER	5	18:53	L	36	
2011	5	11	ER	5	10:20	M	36	
2011	5	30	ER	5	16:30	M	36	
2011	6	6	ER	1	19:45	L	36	
2011	6	14	ER	2	19:55	L	36	
2011	6	16	ER	2	10:20	M	36	
2011	6	15	ER	3	20:00	L	36	
2011	6	30	ER	3	04:50	E	36	
2011	6	15	ER	4	20:00	L	36	3
2011	6	30	ER	4	13:30	M	36	
2011	6	14	ER	5	04:05	E	36	
2011	6	16	ER	5	14:00	M	36	
2011	6	30	ER	5	19:15	L	36	

Year	Month	Day	Obs	VP	Start	EML	5 min periods	
							Total	Target sp.
2011	7	1	ER	1	04:40	E	36	
2011	7	8	ER	1	12:15	M	36	
2011	7	28	MC	1	12:05	M	36	
2011	7	28	MC	1	16:05	M	36	
2011	7	1	ER	2	13:00	M	36	
2011	7	31	GP	2	09:30	M	36	
2011	7	31	GP	2	13:30	M	36	
2011	7	1	ER	3	09:30	M	36	
2011	7	28	GP	3	12:00	M	36	
2011	7	28	GP	3	16:00	M	36	
2011	7	8	ER	4	04:35	E	36	
2011	7	29	GP	4	15:30	M	36	
2011	7	29	GP	4	19:30	L	36	1
2011	7	28	PC	5	13:00	M	36	
2011	7	28	PC	5	17:00	M	36	
2011	8	9	MC	1	15:35	M	36	
2011	8	9	GP	1	19:15	L	36	
2011	8	9	GP	3	15:15	M	36	
2011	8	9	RW	3	19:15	L	36	
2011	8	9	RW	4	15:15	M	36	1
2011	8	9	MC	4	19:15	L	36	3
2011	8	19	SK	2	04:55	E	36	
2011	8	19	SK	2	08:55	M	36	
2011	9	8	SK	3	12:55	M	36	
2011	9	8	SK	3	16:55	L	36	3

Year	Month	Day	Obs	VP	Start	EML	5 min periods	
							Total	Target sp.
2011	9	8	MC	4	12:55	M	36	
2011	9	8	GP	4	16:55	L	36	8
2011	9	16	PC	1	08:15	E	36	1
2011	9	16	PC	1	12:15	M	36	
2011	9	16	MC	5	08:40	E	36	
2011	9	16	MC	5	12:40	M	36	
2011	9	26	ER	2	08:34	M		5
2011	9	26	ER	2	12:40	M	36	
2011	10	21	JN	1	10:20	M	36	
2011	10	21	JN	1	14:20	M	36	
2011	10	21	AJM	3	12:05	M	36	
2011	10	21	AJM	3	16:05	L	36	
2011	10	21	GP	5	12:05	M	36	
2011	10	21	GP	5	16:05	L	36	
2011	10	27	ER	2	09:30	M	36	
2011	10	27	ER	2	13:30	M	36	
2011	10	31	GP	4	09:45	M	36	2
2011	10	31	GP	4	13:45	M	36	
2011	11	11	JN	1	10:20	M	36	
2011	11	11	JN	1	14:20	M	36	
2011	11	11	RW	3	10:20	M	36	1
2011	11	11	RW	3	14:20	M	36	
2011	11	11	AJM	4	10:20	M	36	
2011	11	11	AJM	4	14:20	L	36	
2011	11	11	GP	5	10:20	M	36	

Year	Month	Day	Obs	VP	Start	EML	5 min periods	
							Total	Target sp.
2011	11	11	GP	5	14:20	M	36	
2011	11	21	ER	2	09:30	M	36	
2011	11	27	ER	2	13:00	M	36	
2011	12	20	MC	1	07:40	E	36	
2011	12	20	MC	1	11:40	E	36	1
2011	12	20	JN	3	07:45	E	36	
2011	12	20	JN	3	11:45	M	36	3
2011	12	20	GP	4	07:40	E	36	
2011	12	20	GP	4	11:40	M	36	1
2011	12	23	GP	2	07:40	E	36	
2011	12	23	GP	2	11:40	M	36	
2011	12	23	SK	5	07:40	E	36	1
2011	12	23	SK	5	11:40	M	36	
2012	01	11	MC	1	10:10	M	36	
2012	01	11	MC	1	14:10	L	36	
2012	01	11	GP	3	10:10	M	36	
2012	01	11	GP	3	14:10	L	36	
2012	01	12	ER	2	15:15	L	36	
2012	01	13	ER	2	12:00	M	24	
2012	01	13	ER	2	14:30	M	24	
2012	02	15	KDS	5	10:10	M	36	
2012	02	15	KDS	5	14:00	M	36	
2012	02	17	ER	2	12:00	M	24	
2012	02	17	ER	2	14:30	M	18	
2012	02	17	NV	4	10:35	M	36	

Year	Month	Day	Obs	VP	Start	EML	5 min periods	
							Total	Target sp.
2012	02	17	NV	4	14:35	M	36	
2012	02	22	NV	1	11:00	M	36	
2012	02	22	NV	1	15:00	L	36	
2012	02	24	GP	3	11:40	M	36	
2012	02	24	GP	3	15:40	L	36	
2012	03	12	MC	1	12:05	M	36	
2012	03	12	MC	1	16:05	L	36	
2012	03	12	GP	3	12:05	M	36	
2012	03	12	GP	3	16:05	L	36	
2012	03	12	NV	4	12:05	M	36	
2012	03	12	NV	4	16:05	L	36	
2012	03	12	JN	5	12:15	M	36	
2012	03	12	JN	5	16:15	L	36	1
2012	03	19	ER	2	07:00	E	24	
2012	03	19	ER	2	09:30	M	24	
2012	03	19	ER	2	12:00	M	24	
2012	04	20	JJS	3	16:30	L	36	1
2012	04	21	JJS	2	07:30	E	36	5
2012	04	21	JJS	2	16:30	L	36	3
2012	04	22	JJS	3	07:05	E	36	

Annex 2b - Meteorological conditions during VP watches.

Obs = observer, Wind dir = Wind direction; Wind str. = wind strength on the Beaufort scale; Precip = precipitation;

Precipitation codes are:

0 = no rain

1 = mist / drizzle

2 = light showers

3 = heavy showers

4 = heavy rain

Visibility codes are:

0 = <1km

1 = 1 - 2km

2 = >2km

Year	Month	Day	Obs	VP	Time	Cloud cover %	Wind dir.	Wind str.	Precip	Vis
2011	4	5	RF	1	13:30	100	SW	3	-	2
2011	4	20	RF	1	13:30	0	SW	2	0	-
2011	4	20	RF	1	18:35	0	SW	-	0	2
2011	4	5	ER	2	13:30	100	-	-	-	2
2011	4	20	ER	2	13:33	0	S	1	0	2
2011	4	20	ER	2	18:36	0	S	1	0	2
2011	4	5	RF	3	09:00	90	SW	3	1	2
2011	4	21	ER	3	05:50	30	-	1	-	2
2011	4	21	RF	4	05:50	-	SW	1	0	2
2011	4	21	RF	4	11:15	50	SE	1	0	2
2011	4	5	ER	5	09:05	90	SW	3	1	2
2011	4	21	ER	5	11:05	50	SE	1	0	2
2011	5	11	RF	1	09:00	50	SW	2	0	2
2011	5	12	ER	1	04:50	-	-	3	1	2

Year	Month	Day	Obs	VP	Time	Cloud cover %	Wind dir.	Wind str.	Precip	Vis
2011	5	31	ER	1	11:50	75	SW	3	0	2
2011	5	11	ER	2	06:45	0	SSW	1	0	2
2011	5	12	ER	2	11:00	80	SE	3	0	2
2011	5	30	ER	2	13:00	50	W	1	0	2
2011	5	09	RF	3	18:50	-	-	3	1	2
2011	5	11	RF	3	12:30	-	S- SW	3	0	2
2011	5	30	RF	3	13:05	50	W	1	0	2
2011	5	12	RF	4	05:00	-	SW	3	1	2
2011	5	12	RF	4	10:45	-	SW	4	2	2
2011	5	30	RF	4	16:40	50	W	1	0	2
2011	5	9	ER	5	18:53	0	SW	3	-	2
2011	5	11	ER	5	10:20	-	SW	2	0	2
2011	5	30	ER	5	16:30	50	W	1	0	2
2011	6	6	ER	1	19:45	60	SW	1	0	2
2011	6	14	ER	2	19:55	87.5	SW	1	0	2
2011	6	16	ER	2	10:20	87.5	SW	1	0	2
2011	6	15	ER	3	20:00	87.5	SW	3	1	2
2011	6	30	ER	3	04:50	87.5	SW	2	0	2
2011	6	15	ER	4	20:00	37.5	W	2	0	2
2011	6	30	ER	4	13:30	62.5	W	4	0	2
2011	6	14	ER	5	04:05	50	SW	2	0	2
2011	6	16	ER	5	14:00	100	W	1	0	2
2011	6	30	ER	5	19:15	50	NW	3	0	2
2011	7	1	ER	1	04:40	62.5	N	3	0	2
2011	7	8	ER	1	12:15	50	SE	1	0	2
2011	7	28	MC	1	12:05	100	WSW	3	1	2

Year	Month	Day	Obs	VP	Time	Cloud cover %	Wind dir.	Wind str.	Precip	Vis
2011	7	28	MC	1	16:05	100	W	2	1	2
2011	7	1	ER	2	13:00	62.5	NW	2	0	2
2011	7	31	GP	2	09:30	100	SSE	3	0	2
2011	7	31	GP	2	13:30	100	S	3	1	2
2011	7	1	ER	3	09:30	50	N	2	0	2
2011	7	28	GP	3	12:00	100	W	3	1	2
2011	7	28	GP	3	16:00	100	WSW	2	0	2
2011	7	8	ER	4	04:35	25	SE	1	0	2
2011	7	29	GP	4	15:30	37.5	NNE	1	0	2
2011	7	29	GP	4	19:30	0	WSW	1	0	2
2011	7	28	PC	5	13:00	100	W	3	1	1
2011	7	28	PC	5	17:00	100	W	2	1	2
2011	8	9	MC	1	15:35	75	NW	4	0	2
2011	8	9	GP	1	19:15	100	WSW	2	0	2
2011	8	9	GP	3	15:15	62.5	W	4	0	2
2011	8	9	RW	3	19:15	87.5	W	2	0	2
2011	8	9	RW	4	15:15	50	W	3	0	2
2011	8	9	MC	4	19:15	100	WNW	3	0	2
2011	8	19	SK	2	04:55	50	NW	1	0	2
2011	8	19	SK	2	08:55	75	SW	1	0	2
2011	9	8	SK	3	12:55	50	W	2	0	2
2011	9	8	SK	3	16:55	87.5	W	3	0	2
2011	9	8	MC	4	12:55	75	WNW	2	0	2
2011	9	8	GP	4	16:55	100	WNW	2	0	2
2011	9	16	PC	1	08:15	100	ESE	3	0	2
2011	9	16	PC	1	12:15	100	ESE	3	3	2

Year	Month	Day	Obs	VP	Time	Cloud cover %	Wind dir.	Wind str.	Precip	Vis
2011	9	16	MC	5	08:40	100	SE	4	0	2
2011	9	16	MC	5	12:40	100	SE	4	3	2
2011	9	26	ER	2	08:34	12.5	W	2	0	2
2011	9	26	ER	2	12:40	75	W	1	0	2
2011	10	21	PC	1	12:05	100	SSW	4	2	2
2011	10	21	PC	1	16:05	100	SSW	4	2	2
2011	10	21	AJM	3	12:05	100	SW	4	1	2
2011	10	21	AJM	3	16:05	100	SW	4	1	2
2011	10	21	GP	5	12:05	100	SSW	4	1	2
2011	10	21	GP	5	16:05	100	SSW	3	1	2
2011	10	27	ER	2	09:30	75	W	3	0	2
2011	10	27	ER	2	13:30	75	W	2	0	2
2011	10	31	GP	4	09:45	100	S	3	4	2
2011	10	31	GP	4	13:45	100	S	3	1	2
2011	11	11	JN	1	10:20	100	SE	3	0	2
2011	11	11	JN	1	14:20	100	E	3	0	2
2011	11	11	RW	3	10:20	87.5	E	3	0	2
2011	11	11	RW	3	14:20	100	SSE	3	0	2
2011	11	11	AJM	4	10:20	87.5	SE	3	0	2
2011	11	11	AJM	4	14:20	100	ESE	2	0	2
2011	11	11	GP	5	10:20	100	SE	3	0	2
2011	11	11	GP	5	14:20	100	SE	3	0	2
2011	11	21	ER	2	09:30	100	SW	2	2	2
2011	11	27	ER	2	13:00	100	SW	2	2	2
2011	12	20	MC	1	07:40	100	W	3	0	2
2011	12	20	MC	1	11:40	100	W	2	0	2

Year	Month	Day	Obs	VP	Time	Cloud cover %	Wind dir.	Wind str.	Precip	Vis
2011	12	20	JN	3	07:45	100	SW	3	0	2
2011	12	20	JN	3	11:45	100	SW	3	2	2
2011	12	20	GP	4	07:40	100	WSW	2	0	2
2011	12	20	GP	4	11:40	100	SSE	1	2	2
2011	12	23	GP	2	07:40	87.5	SSW	2	0	2
2011	12	23	GP	2	11:40	100	W	2	2	2
2011	12	23	SK	5	07:40	62.5	W	3	0	2
2011	12	23	SK	5	11:40	100	W	3	3	2
2012	01	11	MC	1	10:10	62.5	SW	4	0	2
2012	01	11	MC	1	14:10	100	SW	5	2	2
2012	01	11	GP	3	10:10	100	SSW	3	0	2
2012	01	11	GP	3	14:10	100	SW	3	2	2
2012	01	12	ER	2	15:15	50	W	3	0	2
2012	01	13	ER	2	12:00	12.5	S	1	0	2
2012	01	13	ER	2	14:30	12.5	S	1	0	2
2012	02	15	KDS	5	10:10	75	NW	3	0	2
2012	02	15	KDS	5	14:00	62.5	NW	4	0	2
2012	02	17	ER	2	12:00	75	W	4	0	2
2012	02	17	ER	2	14:30	100	W	2	0	1
2012	02	17	NV	4	10:35	100	SW	2	1	2
2012	02	17	NV	4	14:35	100	SW	3	2	2
2012	02	22	NV	1	11:00	87.5	WSW	4	1	2
2012	02	22	NV	1	15:00	87.5	WSW	4	1	2
2012	02	24	GP	3	11:40	50	WNW	5	2	2
2012	02	24	GP	3	15:40	62.5	WSW	2	0	2
2012	03	12	MC	1	12:05	100	WSW	3	0	2

Year	Month	Day	Obs	VP	Time	Cloud cover %	Wind dir.	Wind str.	Precip	Vis
2012	03	12	MC	1	16:05	100	WSW	2	0	2
2012	03	12	GP	3	12:05	100	SW	2	0	2
2012	03	12	GP	3	16:05	100	SW	2	0	2
2012	03	12	NV	4	12:05	100	W	3	0	2
2012	03	12	NV	4	16:05	100	W	3	0	2
2012	03	12	JN	5	12:15	100	NW	3	0	2
2012	03	12	JN	5	16:15	100	NW	1	0	2
2012	03	19	ER	2	07:00	50	SW	2	0	2
2012	03	19	ER	2	09:30	62.5	SW	3	0	2
2012	03	19	ER	2	12:00	100	SW	4	0	2
2012	04	20	JJS	3	16:30	-	-	-	-	-
2012	04	21	JJS	2	07:30	100	SW	3	0	2
2012	04	21	JJS	2	16:30	100	SW	2	1	2
2012	04	22	JJS	3	07:05	100	E	3	0	2

Annex 3 - List of target species recorded during VP watches

Target species
Black grouse
Golden Plover
Hen Harrier
Long-eared owl
Merlin
Peregrine
Pink-Footed Goose
Secondary species
Buzzard
Carrion crow
Herring Gull
Kestrel
Oystercatcher
Raven
Sparrowhawk
Tawny owl
Buzzard
Curlew
Goosander
Lesser black-backed gull
Redshank
Snipe

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