

ANNEX B ORNITHOLOGICAL SURVEY METHODOLOGIES

A range of ornithological surveys have been conducted at the revised Douglas West Wind Farm site (hereafter referred to as 'Revised Development site') by Dunnock Environmental Services (DES). The methodologies used in these surveys are summarised in the sections below; more detailed descriptions are provided in the SNH guidance (2014ⁱ), Hardey *et al.* (2013ⁱⁱ) and Gilbert *et al.* (1998ⁱⁱⁱ).

Survey Area

Following a desk study, a survey proposal was drawn up in line with latest SNH guidance on bird survey methods to assess impacts of onshore wind farms (SNH 2014ⁱ). This includes flight activity Vantage Point (VP) surveys, moorland breeding bird surveys, breeding raptor and owl surveys and black grouse surveys. A study proposal outlining the above survey strategy approach was approved by SNH on 16th February 2015 and surveys were undertaken during the 2015 breeding and 2014/2015 non-breeding seasons.

The Collision Risk Analysis Area (CRAA) was created by buffering each turbine by 250 m and joining up the outer boundaries of the buffers. Using the larger 250 m area around the turbines accounts for possible inaccuracies in the recording of flightlines. Target species flight activity within this area was used to inform the Collision Risk Analysis.

B.1 Flight Activity Survey

The aims of the flight activity (Vantage Point, VP) surveys are: (1) to record flight activity within the vicinity of the Revised Development site in order to identify areas of importance to birds; and (2) to quantify flight activity within 500 m of the proposed turbine in order to estimate the likelihood of collision (SNH 2014 P.14-15ⁱ).

Timing

- A survey period of 36 hours is recommended as the minimum level of sampling intensity at each VP for each season (breeding, non-breeding) (SNH 2014 P.17ⁱ);
- Watches were spread as evenly throughout the year as possible to ensure that temporally representative data are collected (see Annex C). Specific consideration was given to the period around dawn and twilight for breeding waders and to changing raptor behaviour across seasons (SNH 2014 P.16ⁱ);
- Watches were suspended and resumed to take account of changes in visibility (e.g. fluctuations in cloud base). Watches were undertaken in conditions of good ground visibility when the cloud base was higher than the most elevated ground being observed; and
- Watches were conducted in a range of weather conditions and were spread throughout the day (see Annexes C and D).

Field Methods

- Surveys undertaken in 2009 to 2010 for the DWCW project used three VPs: VP1, NS 807 334; VP2, NS 821 338; and VP3, NS 810 314.
- Reconnaissance surveys by DES for the 2014 to 2015 surveys confirmed that VP locations 2 and 3 still provided good coverage of the Revised Development site and surrounding CRAA,

although a very small portion of the CRAA was not visible in the north-eastern extent¹ (Figure 8.3). VP 1 also provided good coverage (of areas also covered by VPs 2 and 3) of the Revised Development site and surrounding CRAA however, due to its proximity to turbines and its likely impact on bird behaviour within the CRAA it was decided not to reuse this VP location.

- A maximum 180° view arc was scanned. This rule did not however apply when tracking migratory waterfowl, or raptors across the CRAA;
- Each watch lasted a maximum of three hours but was suspended and then resumed to take account of changes in visibility (e.g. fluctuations in the cloud base).

For species of high nature conservation importance (target species) the following data were recorded (SNH 2014 P.17-18ⁱ):

- The flightlines by individuals or flocks of birds;
- The time the target bird was detected and the duration (seconds) spent flying over a defined study area (the viewshed);
- The birds' flight heights (defined into the following height bands: 0-30 m, 31-40 m, 41-140 m, 141-160 m, >161 m) were recorded at the point of detection and at 15 second intervals thereafter. From this the proportion of time spent flying below, within (referred to as Potential Collision Height (PCH)) and above approximate rotor height could be estimated. The actual rotor height is 19 – 151 m. This difference is accounted for within the collision risk models on the assumption of even flight distribution;
- The route followed was plotted in the field onto 1:25,000 scale maps;
- For secondary species, activity summaries were sub-divided into 5 minute periods at the end of which the number and activity of all secondary species were recorded;
- If a target species was being tracked during a 5 minute period, then the activity summary for that period was abandoned and a new one started once observations of the target species had ended;
- Observation of target species took priority over recording secondary species;
- The number of birds recorded were the minimum number of individuals that could account for the activity observed; and
- Observers only recorded perched birds and birds on water-bodies once only on arrival at the VP. Thereafter only flying birds and newly noticed perched/swimming birds were included in the activity summaries.

B.2 Moorland Breeding Bird Survey

Upland breeding bird survey methodology was employed as detailed within SNH Guidance (SNH 2014 P.11-13ⁱ). In summary, surveys involved the following:

¹ The habitat here is of sufficient similarity such that the survey data collected, and subsequently assessed is considered to be representative of the whole CRAA. In addition, there were no records made during any of the BBS, breeding raptor and walkover surveys which would suggest that this area was of any specific importance to Target Species.

- Open upland (including hedgerows, scrub, isolated trees and copses) was surveyed using an intensive version of the Brown and Shepherd (1993^{iv}) method for upland bird survey;
- The objectives were to map the distribution of breeding bird territories and estimate the approximate size of breeding bird populations;
- When birds could not be easily assigned to territories, guidance from Brown & Shepherd (1993^{iv}) was followed, according to which birds separated by less than 500 m (200 m for dunlin) on a given visit were arbitrarily considered to be from the same pair. After all visits had been completed, registrations of all birds were put on final maps following the above conventions. Estimates of numbers of pairs were then derived from these maps where pairs were considered separate from each other if they were at least 1,000 m apart (500 m for dunlin) between the different visits.
- The survey covered all areas within 500 m of the Revised Development site; and
- All upland wader species were recorded during the breeding bird survey.

Timing

- The area was surveyed four times during the 2015 breeding season as per Calladine *et al.* (2009^v);
- Fieldwork was undertaken between sunrise and sunrise and 1800hrs; and
- Fieldwork was not undertaken in conditions considered likely to affect bird detection rates, for example in winds greater than Beaufort Scale Force 4, persistent precipitation, poor visibility (less than 300 m), or in unusually hot weather.

Field Methods

- Walk-routes which optimised ground visibility were used;
- Surveyors paused at appropriate vantage and listening points;
- Isolated trees, copses and patches of scrub were approached and examined;
- Streams, ditches and hedgerows were walked;
- All other areas were approached to within 100 m; and
- Registrations were mapped at the first location that behaviour indicative of breeding² was observed;
- Standard BTO³ activity codes were used.

² Birds were considered breeding if: adults were displaying or singing; nests, eggs or young were located; adults repeatedly alarm called; adults performed distraction displays; or, adults engaged in territorial disputes.

³ British Trust for Ornithology

B.3 Scarce Breeding Bird Survey

Barn Owl

Barn owl surveys were carried out between January and September 2015 in suitable habitat within the site and a 1 km buffer zone following the methodology described in Hardey *et al.* (2013ⁱⁱ) and Shawyer (2011^{vi}).

Although Hardey *et al.* (2013) recommend that the first visit take place between November and January when deciduous trees are leafless and there is minimal risk of disturbance to early breeding tawny owls, Shawyer (2011^{vi}) recommends that visits can take place between late autumn and early spring. The first visits were carried out by the end of February, when trees were still leafless, and since no inspections of cavities were carried out there was no risk of disturbing tawny owls.

All potentially suitable structures (e.g. disused buildings, bridges, trees) were inspected for signs⁴ of barn owl presence and potential barn owl nest sites. In particular, suitable trees were inspected for potential nest site cavities. These included ash, sycamore and crack willow trees with a trunk diameter at chest height in excess of 0.5 m, beech and horse chestnut trees with a trunk diameter at chest height in excess of 0.75 m and oak trees with a trunk diameter at chest height in excess of 1.5 m as well as trees with premature decay as a result of lightning strikes or wind damage and cavities of at least 80 mm.

Some potentially suitable cavities for barn owls in trees were inaccessible from the ground and would need specialist climbing equipment or tree climbers. These were not further inspected.

The survey involved the following elements:

- 24th January 2015 - vantage point watches from Arkney Hill (NS 81120 31480) and Wallace's Cave (82111 33771) to check for potential nest site locations. This allowed the elimination of the whole of the western site boundary, which consists of dense Sitka spruce plantation, as well as large areas of the coniferous and young broadleaved woodland sections along the eastern boundary, with a few mature broadleaved trees with potential for nest holes located primarily in the south-eastern section to the south and north of the site. There were no suitable mature trees within the site itself.
- 31st January 2015 - inspection of structures with potential nest sites around the northern, north-western and north-eastern periphery of the Revised Development and a surrounding 1 km buffer zone. This included:
 - Various buildings at the former Scottish Coal offices at Middlemuir Road in Coalburn (NS 809 342);
 - Westtoun Villa, a small building located ca. 300 m to the south-west of the office buildings, and adjacent trees (NS 807 340);
 - Brackenside ruin and adjacent tree (NS 804 330);
 - Trees within the Poniel Water valley (e.g. NS 802 331);

⁴ i.e. pellets, feathers, droppings, whitewash, scratch marks, sightings.

- Poniel Farm and adjacent trees (NS 840 342);
 - A treeline to the north-east of Poniel Farm (ca. NS 842 343); and
 - The dwellings and trees around Craigend (NS 828 335) and Westerhouse (NS 828 334).
- 28th February 2015 - inspection of structures with potential nest sites around the eastern and south-eastern periphery of the site and a surrounding 1 km buffer zone. This included a variety of trees between Scrogton Farm and Long Plantation as well as the bridges of the dismantled railway line.
 - 8th May 2015 - two mature trees north of the site identified in February 2015 as having nest potential were re-inspected from the ground.
 - 12th May 2015 - detailed inspections of those structures that had been identified during the visits in January and February 2015 as having nest potential (bar the above two trees). As signs of bat use had been identified at the former Scottish Coal offices in Coalburn and at Westtoun Villa by a third party since the original inspection of 31st January, the visits of 12th May were conducted in the presence of a licensed bat worker.
 - 19th June 2015 - dusk VP watches from two locations along the southern section of the access road to the Revised Development site, as follows: NS 83520 33988 - south-west corner of Dewar's compound looking south-west and NS 83219 33112 just north of where the access road meets the DP looking north-west. The northern VP overlooked the Craigend/Westerhouse dwellings, the area to the north of these and the young plantations along the Poniel Water to the east of the dwellings. The southern VP overlooked the Craigend/Westerhouse dwellings (partially obscured by a small copse), the area to the south of these, the young plantations along the Poniel Water east of the dwellings and the north-eastern corner of the site.
 - 25th June 2015 - re-inspections of the former Scottish Coal offices in Coalburn and of Westtoun Villa.
 - 2nd September 2015 - re-inspections of the former Scottish Coal offices in Coalburn and of Westtoun Villa to account for the fact that in 2015 some female barn owls were late getting into breeding condition and to look for late clutches.

Raptors

On the basis of a desk-based study (see Technical Appendix 8.1) and given the relative proximity of the Muirkirk and North Lowther Uplands Special Protection Area (SPA), the primary species likely to be encountered within the site were considered to be hen harrier and merlin, with goshawk, peregrine and short-eared owl potentially occurring as well.

- Based on the methodologies described in Hardey *et al.* (2013ⁱⁱ), DES developed a survey strategy that targeted these species, whilst recording all target raptor and owl species;
- Surveys were undertaken within the site and a surrounding 2 km buffer zone;
- Surveys visits were carried out jointly with the South Strathclyde Raptor Study Group (SSRSG);

- A three-visit approach was decided upon, consisting of a mixture of 4-6 hour VP watches and walk-overs with short (ca. 15 min) VPs spread throughout the breeding seasons of the above target species;
- Surveys focused on the time windows when evidence of breeding (in particular territorial occupancy, nests and young) was expected to be most detectable;
- Visit one took place between late March and early April to record evidence of territory occupancy;
- Visit two took place between early and late May to record evidence of active nests/incubating females; and
- Visit three took place around mid-June to check for young bird and to search for additional nests.

B.4 Black Grouse Survey

Previous surveys in 2009 to 2010 recorded black grouse within the 1.5 km site buffer area, and a desk-based study has shown that leks have occurred in the surrounding area in the past (see Technical Appendix 8.1).

Black grouse surveys to identify areas of black grouse activity and to locate lek locations were conducted within the recommended survey period of late March to mid-May 2015, and in suitable weather conditions. There were therefore no limitations to the surveys. Surveys were carried out in suitable habitat within the site and a surrounding buffer zone of 1.5 km following the methodology described in Gilbert et al. (1998ⁱⁱⁱ).

Surveys involved two walk-over visits on 6th and 8th April 2015 and on 30th April and 1st May 2015, roughly during the period of one hour before to two hours after local sunrise. Two surveyors covered different parts of the site walking slowly along woodland edges with short stops to look and listen for black grouse, covering all suitable habitat within 500 m. The direction of the walk-overs was varied between visits to avoid any bias connected to the time of survey.

In addition, two watches over historic lek sites were carried out during the period of roughly one hour before to one hour after local sunrise. The first watch took place on 30th April 2015 during which one surveyor overlooked a known historic lek site located within the southern 1.5 km buffer around the site and on the Hagshaw Hill Extension Wind Farm area.

The second watch took place on 1st May 2015 during which two surveyors simultaneously overlooked historic lek sites to the west of the site, followed by a walk-over of the wider area.

In addition 11 standard VP watches for target raptor and wildfowl were carried out at times that overlapped with the recommended black grouse survey period of last week of March to mid-May 2015. Seven of these took place around dawn and four around dusk overlooking the site.

ⁱ Scottish Natural Heritage (2014) Recommended bird survey methods to inform impact assessment of onshore windfarms.

ⁱⁱ Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. and Thompson, D. (2013) Raptors: a field guide for surveys and monitoring (3rd edition). The Stationery Office, Edinburgh.

ⁱⁱⁱ Gilbert, G., Gibbons, D. W. and Evans, J. (1998) Bird Monitoring Methods. RSPB, Sandy.

^{iv} Brown, A. F. and Shepherd, K. B. (1993) A method for censusing upland breeding waders. *Bird Study*, 40: 189-195.

^v Calladine, J., Garner, G., Wernham, C., and Thiel, A. (2009) The influence of survey frequency on population estimates of moorland breeding birds. *Bird Study*, 56: 3, 381-388.

^{vi} Shawyer, C.R. (2011) Barn Owl *Tyto alba* Survey Methodology and Techniques for Use in Ecological Assessment: Developing Best Practice in Survey and Reporting. IEEM: Winchester (revised April 2012).