APPENDIX 7-7

BIRD MONITORING PROGRAMME

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1. INTRODUCTION

This Bird Monitoring Programme has been prepared by MKO for the Proposed Project. This document provides a timeframe and monitoring schedule for the bird population of the Proposed Wind Farm site during the construction and post-construction phases of the Project. Bird surveys were undertaken from September 2020 to May 2023, encompassing two breeding seasons and three winter seasons, as well as autumn and spring migration periods. Key ornithological receptors (KORs) in the study area were identified based on these surveys. These surveys were in line with NatureScot (formerly SNH) guidance entitled *"Recommended bird survey methods to inform impact assessment of onshore wind farms"* (SNH, 2017). The surveys undertaken to date have informed the various proposed bird monitoring measures outlined in this document.

1.1 Key Ornithological Receptors

Table 7 - 7 - 1 lists the key ornithological receptors (KORs) recorded within the Proposed Wind Farm during surveys conducted from September 2021 to May 2023 inclusive. These species form the basis of the Bird Monitoring Programme.

Table 7 - 7 - 1 Key ornithological receptors identified during surveys

Species	Scientific Name	Conservation Status
Hen Harrier	*Circus cyaneus*	Annex I of Birds Directive
Peregrine	*Falco peregrinus*	Annex I of Birds Directive
Barn Owl	*Tyto alba*	BoCCI Red Listed
Kestrel	*Falco tinnunculus*	BoCCI Red Listed
Red Grouse	*Lagopus lagopus*	BoCCI Red Listed
Snipe	*Gallinago gallinago*	BoCCI Red Listed
Buzzard	*Buteo buteo*	Species sensitive to wind farm developments (Raptor Species)
Sparrowhawk	*Accipiter nisus*	Species sensitive to wind farm developments (Raptor Species)

1.2 Objectives

This document has been prepared having regards to the following objectives:

- To ensure any required construction phase monitoring is scheduled to avoid impacts on birds of conservation concern during the construction phase
- To record birds using the study area and their interaction with operating turbines
- To monitor short-term and long-term effects on bird populations in the study area, with a particular emphasis on birds of high conservation concern (birds listed on Annex I of the EU Birds Directive or on the Red List of Birds of Conservation Concern in Ireland).
- To undertake collision monitoring for potential bird fatalities as a result of a collision with turbine blades.
- To report on the findings of monitoring at the end of Years 1, 2, 3, 5, 10 and 15 of the extended operational life of the wind farm.
- To ensure any required decommissioning phase monitoring is scheduled to avoid impacts on birds of conservation concern during the decommissioning phase.

2. METHODOLOGY

2.1 Pre-construction Monitoring

It is proposed that construction works will commence outside the bird nesting season (1st of March to 31st of August inclusive) to avoid the most sensitive time of the year for most bird species with the potential to use the site and its environs. Any requirement for construction works to run into the breeding season following commencement will be subject to additional bird surveys.

Pre-commencement confirmatory surveys will be undertaken prior to the initiation of works at the Proposed Wind Farm site. The survey will aim to identify sensitive sites (e.g. nests or roosts). Any requirement for construction works to run into subsequent breeding or winter seasons following the commencement of works will be subject to a repeat of the pre-construction bird surveys to confirm the absence of breeding birds of conservation concern once per month during the breeding season (April to July) and once during the winter season (October). The survey will aim to identify sensitive sites e.g., nests or roosts depending on the season in question.

Monitoring will be undertaken by a suitably qualified ornithologist. The survey will include a thorough walkover survey to a 500m radius of the development footprint and/or all works areas. If winter roosts or breeding activity of birds of high conservation concern is identified, the roost or nest site will be located and earmarked for monitoring at the beginning of the first winter or breeding season of the construction phase. If the roost/nest is found to be active during the construction phase no works shall be undertaken, works will cease within a species-specific buffer of this location in line with most recent best practice guidance (e.g., Forestry Commission Scotland, 2006; Goodship and Furness 2022; Ruddock and Whitfield, 2007). No works shall be permitted within the buffer until it can be demonstrated that the roost or nest is no longer occupied.

All site staff and subcontractors will be made aware of any restrictions to be imposed by means of a toolbox talk and a map of the 'no-work zone' will be made available to all construction staff. The restricted area will also be marked off using hazard-tape fencing to alert all personnel on site to the suspension of works within that area.

2.2 Operational Phase Bird Monitoring

Survey methods employed for the operational phase monitoring will be in line with guidelines issued by the NatureScot (NatureScot, 2009 and NatureScot, 2017). Operational phase monitoring will be undertaken in Years 1, 2, 3, 5, 10 and 15 of the Proposed Wind Farms lifetime.

Operational phase monitoring will include vantage point surveys, bird distribution and abundance surveys and a programme of regular corpse searching for birds that may potentially collide with operating turbines during the operational phase of the wind farm project.

Bird monitoring will include the following survey methods:

- Flight activity surveys: vantage point surveys
- Breeding bird surveys: Adapted Brown & Shepherd
- Targeted bird collision surveys (corpse searches) will be undertaken by a trained dog and handler. The surveys will include detection and scavenger trials, to correct for these two biases and ensure the resulting data is robust.

2.2.1 Vantage Point Surveys

Vantage point surveys will be undertaken monthly during operational years 1, 2, 3, 5, 10 and 15 of the lifetime of the Proposed Wind Farm. The methodology for vantage point watches will follow guidelines issued by the NatureSot (SNH, 2009) and NatureScot (SNH, 2017). The proposed vantage point watches will adhere to a minimum of 36 hours/VP per season as per guidelines issued by NatureScot. During monitoring years, monthly visits will be undertaken for twelve months commencing at the beginning of breeding or non-breeding season: depending on which comes first.

During each visit, six-hour vantage point watches (with a 30-minute break after the first three hours) will be undertaken from each fixed vantage point location that offers an uninterrupted view of the study area. Vantage points will be undertaken from the same locations as pre-planning surveys which informed the EIAR (i.e., VPs 2, 3a and 4a). The adequacy of the vantage point viewsheds will be monitored throughout the lifetime of the wind farm. Vantage point surveys will be timed to provide a spread over the full daylight period including dawn and dusk watches to coincide with the highest period of bird activity. Behavioural categories for the observation of bird interactions with operational wind farms will be in line with the terminology outlined by Meredith *et al.*, (2002).

2.2.2 Distribution and Abundance Surveys

2.2.2.1 Breeding Walkover Survey

During monitoring years, post-construction breeding walkover surveys will follow the adapted Brown & Shepard survey methods. The survey methodology will be similar to methods employed for baseline EIAR surveys which will allow a comparison of data to be made for each monitoring year.

The timing of visits will follow the recommendations of Calladine *et al.* (2009). Transects should ensure all areas of suitable breeding/ foraging habitat are approached to within 100m. Target species will include waders, raptors, waterbirds, gulls and other birds of conservation concern. Along with target species, all additional species observed will be recorded to inform the evaluation of supporting habitat. These surveys will follow the same routes that were followed during pre-planning surveys.

A total of four site visits will be undertaken during the breeding season for each monitoring year and timed to coincide with the core breeding period of April - July (Calladine et al. (2009)). Notes will be recorded on nesting and territorial behaviour and breeding signs using standard BTO codes. Non-breeding behaviour such as birds flying over the site will also be recorded.

2.2.3 Collision Searches (Carcass Searches)

Carcass searches for bird casualties as a result of collision with turbines will follow survey methods broadly based on guidelines issued by the SNH (2009) and search methods adopted by Duffy and Steward, *'Turbine Search Methods and Carcass Removal Trials at the Braes of Doune Windfarm'* (Natural Research Information Note 4. Natural Research Ltd, Banchory, UK, 2008).

The Proposed Wind Farm site will be visited once per month during operational Years 1, 2, 3, 5, 10 and 5 of the lifetime of the wind farm by a trained dog and handler. During each visit, the base of each operating turbine will be searched for bird carcasses. The area to be searched will be based on the turbine size and surrounding landscape. Edkins (2014) "Impacts of Wind Energy Developments on Birds and Bats: Looking into The Problem", recommends the "search width should be equal to the maximum rotor tip height". Given a turbine rotor tip height of between 179.5 and 180 meters the search area surrounding the base of the turbine would be taken as a radius of between 89.5 and 90 meters centred on the turbine base. This area will be the subject of target searches for bird casualties. Searches will incorporate the use of transects spaced at 10m intervals apart with the observer covering 5m on either side for each transect. Locations and coordinates of transect routes will be confirmed

using a portable GPS recording device. Recording sheets will be used to document bird carcasses encountered in the field.

If a bird carcass is found, the following details will be recorded: GPS location of each bird carcass, photographic record, carcass condition (intact - carcass that is completely intact or not badly decomposed; scavenged - evidence that the carcass was fed upon by a scavenger/predator; or feather spot - ten or more feathers indicating predation or scavenging or two or more primary feathers must be present to consider the carcass a casualty), distance from the turbine, date and time.

Carcass removal trials and searcher efficiency trials will be undertaken to account for the ability of the dog to find bird carcasses and the likelihood of scavenging of carcasses by animals. This is done to ensure a more accurate estimation of the total number of collision victims. During carcass removal trials, a carcass is placed in a study area periodically and is monitored for a set number of days or until scavengers remove the carcass (this can be done with the use of a trail camera). A determination on carcass removal is made when no body parts containing flesh or bone or >10 disarticulated feathers can be found. During searcher efficiency trials, a number of carcasses are placed in a study area by one worker, then searched for by the dog two days later. A 24-48-hour period between laying carcasses and searching for them will prevent the dog following the scent of the layer rather than the carcasses. The result of these trials is a correction factor that can be applied to the results of the carcass searches.

2.2.4 Summary

Table 7 - 7 - 2 summarises the proposed bird monitoring schedule for each monitoring year (Years 1, 2, 3, 5, 10 and 5 of the lifetime of the wind farm).

Table 7 - 7 - 2 Proposed bird monitoring schedule

Survey	Phase	Period	Visits	Survey Method
Vantage Point Surveys	Years 1, 2, 3, 5, 10 and 15	Commencing at the beginning of the breeding or non-breeding season and continuing for 12 months thereafter.	1 visit/VP per month for each monitoring year	Three fixed, 6-hour, Vantage Point Surveys
Breeding Walkover Surveys	Years 1, 2, 3, 5, 10 and 15	April - July	4 visits per monitoring year	Adapted Brown & Shepherd Surveys
Collision Monitoring	Years 1, 2, 3, 5, 10 and 15	Commencing at the beginning of the breeding or non-breeding season and continuing for 12	1 visit per month for each monitoring year	Targeted corpse searches at turbine base.

Survey	Phase	Period	Visits	Survey Method
		months thereafter.		

2.3 Decommissioning Monitoring

It is proposed that decommissioning works will commence outside the bird nesting season (1st of March to 31st of August inclusive) to avoid the most sensitive time of the year for most bird species with the potential to use the site and its environs. Any requirement for decommissioning works to run into the breeding season following commencement will be subject to additional bird surveys.

Decommissioning surveys will be undertaken prior to the initiation of works at the Proposed Wind Farm. The survey will aim to identify sensitive sites (e.g. nests or roosts). Any requirement for decommissioning works to run into subsequent breeding or winter seasons following the commencement of works will be subject to a repeat of the decommissioning bird surveys to confirm the absence of breeding birds of conservation concern once per month during the breeding season (April to July) and once during the winter season (October). The survey will aim to identify sensitive sites e.g., nests or roosts depending on the season in question.

Monitoring will be undertaken by a suitably qualified ornithologist. The survey will include a thorough walkover survey to a 500m radius of the development footprint and/or all works areas. If winter roosts or breeding activity of birds of high conservation concern is identified, the roost or nest site will be located and earmarked for monitoring at the beginning of the first winter or breeding season of the construction phase. If the roost/nest is found to be active during the construction phase no works shall be undertaken, works will cease within a species-specific buffer of this location (e.g., Forestry Commission Scotland, 2006; Goodship and Furness 2022; Ruddock and Whitfield, 2007) in line with most recent best practice. No works shall be permitted within the buffer until it can be demonstrated that the roost or nest is no longer occupied.

All site staff and subcontractors will be made aware of any restrictions to be imposed by means of a toolbox talk and a map of the 'no-work zone' will be made available to all construction staff. The restricted area will also be marked off using hazard-tape fencing to alert all personnel on site to the suspension of works within that area.

2.4 Reporting

A report summarising the findings of bird monitoring surveys will be submitted to the Planning Authority at the end of each monitoring year (i.e., Year 1, 2, 3, 5, 10 and 15. The report will provide the results of the surveys and discuss potential impacts on birds (particularly KORs) and any recommendations that may inform additional mitigation measures during the operational phase of the wind farm project.

3. BIBLIOGRAPHY

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