APPENDIX 7-7

BIRD MITIGATION PLAN

DOCUMENT DETAILS

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1. INTRODUCTION

This Bird Mitigation Plan has been prepared by MKO for the Proposed Project. It has been informed by surveys undertaken from September 2020 to September 2023. Based on these surveys, key ornithological receptors (KORs) in the study area were identified and the potential effects of the Proposed Project on these receptors during the construction, operational and decommissioning phases are assessed in the Environmental Impact Assessment Report (EIAR).

During preparation of the EIAR, the potential effects of collision risk during the operational phase of the Proposed Wind Farm was assessed. For the majority of KORs assessed, the effect was determined to be of no greater than 'low' significance (as defined by Percival, 2003). However, the effect was determined to be of 'medium' significance for two species - lapwing and golden plover. It was deemed necessary to mitigate the significance of this effect. Thus, a Bird Mitigation Plan was prepared for these two species, prescribing measures to mitigate this effect such that the significance of the residual effect will be of 'low' significance.

The objective of the Bird Mitigation Plan is to reduce flight activity of lapwing and golden plover in the vicinity of the operating turbines. The following sections describe lapwing and golden plover ecology and the predicted impacts of the Proposed Project on birds using the Site. The next section presents the methods for the approach, land area selection, management prescriptions and implementation of this Bird Mitigation Plan. The final section outlines monitoring and evaluation of the proposed mitigation measures. Reporting on the effectiveness of the Bird Mitigation Plan will be incorporated into the reporting for the Bird Monitoring Programme for the Proposed Project (refer to Appendix 7-8 Bird Monitoring Programme).

1.1 Lapwing and Golden Plover Ecology

During winter, foraging lapwing and golden plover in Ireland utilise lowland agricultural pastures (particularly permanent pasture and damp fields), where their invertebrate prey resides just below the soil surface and are accessible to the birds, even during periods of cold weather. Lapwing and golden plover may also utilise winter cereals, although their invertebrate prey tend to be less abundant here. Both species tend to avoid bare till, as the lack of vegetative insulation causes their invertebrate prey to move down the soil profile, where it cannot be reached by the birds (Fuller and Lloyd, 1981; Gillings and Fuller, 1999). There is some evidence that they may also avoid sheep pasture for similar reasons; sheep graze the grass tight, reducing vegetative insultation and thus reducing access to invertebrate prey (Tucker, 1992). Lapwing and golden plover also tend to avoid pasture with high swards (Brough and Bridgman, 1980; Gregory, 1987). This may be because invertebrate prey are more difficult to detect and access among obscuring vegetation, in combination with other factors such as reduced mobility and the chilling effects of wet vegetation (Butler and Gillings, 2004).

Roosting lapwing and golden plover utilise pasture and arable land during winter (Fuller and Lloyd, 1981). Open fields with short swards may be preferred because of improved predator detection by roosting flocks (Brough and Bridgman, 1980).

1.2 Description of Impacts

During pre-planning surveys from September 2020 to September 2023, lapwing and golden plover were recorded using the study area. Both species were regularly recorded in flight or foraging and roosting in fields during winter. They were observed in improved or wet grassland, which was sometimes flooded, and very occasionally in arable fields.

During preparation of the EIAR, a collision risk assessment was conducted for both species using the Band Model (Band, 2007). Data collected during vantage point surveys was used to predict the number

of collisions that may be caused by a turbine, based on winter season flight activity (refer to Appendix 7-6 Collision Risk Assessment of the EIAR). The number of lapwing collisions per year was estimated to be 69 and the number of golden plover collisions per year was estimated to be 56.

The county population for each species was estimated using data from Irish Wetland Bird Survey sites within a 25km radius of the proposed turbines, which is considered a reasonable approximation for the size of a county in Ireland. While it is acknowledged that there are limitations to using these data, it is currently the best available data, as there are no other systematic counts of lapwing or golden plover in this part of Ireland, and it provides a higher resolution than inferring county populations from national counts which do not take into account variation in spatial distribution nationwide. The county population of lapwing was estimated to be 518 birds and the county population of golden plover was estimated to be 580 birds.

The literature indicates that annual natural mortality of lapwing is 29.5% (Peach *et al.,* 1994) and annual natural mortality of golden plover is 27% (Sandercock, 2003). Thus, an estimated 153 lapwing and an estimated 157 golden plover in the county are assumed to die of natural causes each year. If 69 lapwing fatalities were to occur at the Proposed Wind Farm each year, it would increase mortality rates in the county population by 45%. If 56 golden plover fatalities were to occur at the Proposed Wind Farm each year, it would increase mortality rates in the county population by 36%. In both cases, this impact is of 'medium' significance (as defined by Percival, 2003). Thus, mitigation measures are proposed.

2. METHODOLOGY

2.1 Approach

Collision risk mitigation will focus on reducing lapwing and golden plover flight activity within 500m of the turbines. Because lapwing and golden plover were observed flying in to forage and roost in fields within the study area, the mitigation approach is to remove attractive foraging and roosting features from these fields to deter birds from using them. The sward height of grass within these fields will be controlled to remove the stimulus for foraging and roosting. Tethered bird control kites will also be erected in the fields to provide additional visual deterrents. Similar approaches have been used to deter waders and seabirds from airfields in the UK to reduce the risk of collision with aircraft (e.g. Brough and Bridgman, 1980; O'Shea *et al.,* 2020). In addition, studies have shown that golden plover may use the presence of lapwing as a visual cue to identify suitable foraging areas, and tend to fly over several flocks before choosing a flock to join (Barnard and Thompson, 1985). The absence of grounded flocks should further reduce the flight activity of these prospecting flocks in the turbine area. This mitigation approach will be implemented in the areas of the site that were observed to be the most attractive to lapwing and golden plover. The process of field selection for mitigation is discussed in further detail in the next section.

2.2 Land Selection

The results of pre-planning surveys from September 2020 to September 2023 indicate that lapwing and golden plover do not uniformly utilise the study area, rather specific areas were favoured. Such favoured fields that were also located in close proximity to turbines were targeted for mitigation.

1. All fields within a 500m radius of the turbines which lapwing or golden plover were recorded using were eligible for evaluation. In circumstances where a field with no birds present linked surrounding fields that were used by birds, the linking field was eligible, to account for birds moving around a group of fields as a unit.

2. Due to the species in question, the nature of the data and the purpose of the analysis, fields were considered for mitigation if they met either of the following criteria:

    - Lapwing or golden plover of county importance were observed using an area of fields two or more times during the survey period (ie. landed in the field or were foraging or roosting). Following NRA (2009), a population of County Importance is a regularly occurring population that exceeds 1% of the county population. Thus, a regularly occurring population of at least five lapwing or at least six golden plover is considered to be a population of County Importance in the study area.

    - Large flocks of lapwing or golden plover were observed using an area of fields one or more times during the survey period (ie. landed in the field or were foraging or roosting). Large flocks are defined here as 20% or more of the county population. A large flock of lapwing was defined as over 103 birds and a large flock of golden plover was defined as over 116 birds.

3. Fields meeting this criteria that were within the Site with landowner agreement were selected for mitigation.

A total of nine fields were selected for mitigation. These fields are within the Site and form part of the planning application, therefore are under the control of the applicant (refer to the landowner agreements in the accompanying planning pack). Landowners are aware of these provisions and supportive of their implementation. The mitigation fields are presented in Figure 7 - 7 - 1.

Map Legend

- Mitigation Fields
- Site Boundary

N

Drawing Title

Mitigation Fields

Project Title

Borrisbeg Wind Farm

Drawn By	Checked By
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220310-c	Figure 7-7-1
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2.3 Management Prescriptions

This section outlines the management prescriptions that are proposed to reduce the attractiveness of the mitigation fields to lapwing and golden plover, and hence reduce flight activity in the turbine area and its associated collision risk. The key measure is to increase the sward height of grass in the mitigation fields so that they are unsuitable for foraging and roosting. As a secondary measure, tethered bird control kites will be erected in each mitigation field to deter birds.

Sward Height

A review of the literature shows that the optimum sward height of pasture grass for waders including golden plover and lapwing is approximately 7-10cm (Brough and Bridgman, 1980; Gregory, 1987; Milson *et al.,* 1998). Golden plover and lapwing tend to avoid pasture with sward heights exceeding 10-20cm (Brough and Bridgman, 1980; Gregory, 1987). Thus, a minimum sward height of 15cm will be used as a deterrent.

There are a number of farming strategies that can be used to control the sward height, and the optimum strategy will depend on the existing farming practices within each individual field. The actions to be undertaken and an action date for when they should be undertaken will be planned by a suitably qualified person. Importantly, the management actions will need to begin in advance of 1st October so that the sward exceeds 15cm on this date, before the arrival of wintering lapwing and golden plover. Strategies may include, but are not limited to:

- Do not cut the grass in the field (e.g. topping or silage) after the action date to allow the grass time to regrow;
- Remove grazing livestock from the field before the action date to allow the grass time to regrow;
- Apply fertilizer to the field before the action date to allow the grass time to grow;
- Any farming activities that will reduce the sward height cannot begin until after the 31st March.

Bird Control Kites

The bird control kites will be imitations of raptor birds (e.g. hawks, falcons) and attached to a tether approximately 8m in length, in turn attached to a pole approximately 10m in length, that is secured to the ground near the centre of the field to maximise the effect. This will create weaving and hovering movements akin to hunting raptor birds c. 2-18m above the ground and will be suitable for a range of wind speeds (O'Shea *et al.,* 2020). This representation of a hunting predator will provide additional deterrents to lapwing and golden plover landing in the field. Bird control kites are widely used to deter birds from crops and gardens and have been shown to reduce the number of birds present in agricultural fields and airfields (O'Shea *et al.,* 2020).

Timeframe

It is proposed to apply mitigation measures during the wintering period as this was the key collision risk period for lapwing and golden plover. Surveys conducted in the study area between September 2020 and September 2023 indicate that wintering lapwing and golden plover numbers of County Importance (five or six birds respectively) most often occurred within 500m of the turbines between the months of October and March. Over all winters combined, wintering lapwing were first observed in August (1 observation of 3 birds), but there was a notable increase in October (11 observations of up to 79 birds). They were

recorded through the winter until February (6 observations of up to 80 birds), after which there was a notable decrease in March (9 observations of up to 5 birds). Over all winters combined, wintering golden plover were first observed in October (19 observations of up to 300 birds). They were recorded through the winter until March (9 observations of up to 92 birds), after which there was a notable decrease in April (1 observation of 64 birds). Thus, mitigation measures will be in effect between 1st October and 31st March each year of operation.

Summary

In summary, the following management prescriptions will be in place in the mitigation fields for the operational lifetime of the Proposed Wind Farm (summarised in Table 7 - 7 - 1):

- Grass sward length throughout the field will exceed 15cm between 1st October and 31st March inclusive each winter;
- A bird control kite will be erected near the centre of the field between 1st October and 31st March inclusive each winter inclusive.

Table 7 - 7 - 1 Management prescriptions

Prescription	Time Period	Year of Operation
Grass sward length of 15cm +	October to March	Every year
Kite erected	October to March	Every year

2.4 Implementation

It is proposed that a suitably qualified environmental scientist, ornithologist or ecologist will be engaged by the wind farm operator to oversee the implementation of this Bird Mitigation Plan. The management prescriptions will be implemented on an individual landowner-by-landowner basis as follows:

1. At the pre-application stage, the management prescriptions have been explained to the individual landowners prior to inclusion in the application and are acceptable to each consenting landowner.
2. At the pre-commencement stage, a meeting will be held with individual landowners to outline the general aims, objectives and requirements of the Bird Mitigation Plan.
3. At the pre-commencement stage, a Growing Schedule will be provided to the landowner for each individual field based on the current agricultural management practices, stocking rates and habitat conditions. The Growing Schedule will comprise a list of actions to be undertaken and an action date for when they should be undertaken. Actions may be chosen from the various recommended options and practices outlined in Section 2.3 above.
4. At the pre-commencement stage, a bird control kite (including tether and pole) will be provided for each individual field. All kites should meet the specifications outlined in Section 2.3 above. Instructions on deployment of the kite will be included in the Growing Schedule discussed in Point 3.
5. During each year of the operational phase, the Growing Schedule actions will be undertaken by each landowner.

6. During each year of the operational phase, the overseeing environmental scientist, ornithologist or ecologist will monitor and evaluate the mitigation fields. Full details of the monitoring and evaluation are outlined in Section 3 below.

7. If the agricultural management practices, stocking rates and habitat conditions in any mitigation field change, the Growing Schedule will be revised accordingly by the overseeing environmental scientist, ornithologist or ecologist.

8. If bird control kites become damaged or no longer function, they will be replaced by the wind farm operator in a timely manner.

3. MONITORING AND EVALUATION

3.1 Previous Studies

Similar approaches to the Bird Mitigation Plan proposed here have been used to deter birds at other places. For example, Brough and Bridgman (1980) investigated long grass as a method for reducing bird collisions with aircraft in 13 airfields in the UK. The authors conducted trials in which stands of long grass were grown along the runways and compared the number of birds present to control sites. Birds such as lapwing, golden plover, woodpigeon, rook, starling and gull species were fewer and occurred less frequently on grass stands 15-20cm high. The repellent effect of long grass was considered to be 'almost complete' for golden plover and 'very good' for lapwing. O'Shea *et al.* (2020) investigated imitation hawk-kites as a method for deterring woodpigeons from airfields in Ireland. Trials with and without kites were conducted at an airfield and agricultural farmland. There was a significant reduction in the mean number of woodpigeons crossing sites with kites compared to control sites.

This habitat modification approach has benefits in comparison to other bird deterrent approaches. In a comprehensive evaluation of the products and techniques for controlling birds in airports, Transport Canada classified habitat modification (including control of sward height) as one of their highly recommended approaches. It is a passive approach that does not require the use of disruptive noise or light (e.g. in comparison to playing distress calls or using pyrotechnics and gas cannons), is not disturbing to landowners with livestock or crops (e.g. in comparison to deterring birds with trained falcons and dogs or using water spray), does not require the release of chemical repellents into the environment (e.g. in comparison to using lumbricides or other poisons to remove invertebrate prey) and is not disturbing to other wildlife (e.g. in comparison to ultrasound, infrasound or microwave broadcasts). A passive habitat modification approach will also avoid risky evasive flying manoeuvres in birds that have entered the turbine area in comparison to many active bird control measures.

3.2 Annual Assessment

Monitoring and evaluation by a suitably qualified environmental scientist, ornithologist or ecologist will be required to ensure the effectiveness of this Bird Mitigation Plan. Monitoring and evaluation of the Bird Mitigation Plan will be carried out in conjunction with the proposed Bird Monitoring Programme (refer to Appendix 7-8 Bird Monitoring Programme of this EIAR). The Bird Monitoring Programme proposes a suite of bird surveys and collision monitoring carcass searches to be conducted at the Site during operation, in line with best practice guidance. The findings of the Bird Monitoring Programme will provide further insight into the effectiveness of the Bird Mitigation Plan.

All of the mitigation fields will be monitored and evaluated each operational year. Monitoring will comprise:

- A field inspection;
- Monitoring adherence to the Growing Schedule;
- Assessment of the Growing Schedule;
- Reporting.

Field inspection

The mitigation fields will be visited by the overseeing environmental scientist, ornithologist or ecologist each year of operation to assess the habitat for its suitability for and attractiveness to lapwing and golden plover. Four visits will be undertaken between October and March. The first visit will be in October to

ensure that the sward is at an appropriate height at the beginning of the winter season. The remaining visits should be spread throughout the winter up to the end of March. Four properties of the field will be recorded:

1. Record (i) the percentage vegetation cover of grass versus other vegetation types (e.g. scrub, woodland) and (ii) the average sward height of grass and in each field. Remark on its suitability for foraging and roosting lapwing and golden plover.

2. Record the composition (e.g. fence, hedgerow, treeline), height and density of field boundaries. Remark on the features that may influence lapwing and golden plover site selection such as 'openness' and sightlines.

3. Record features within the field: (i) flooding or standing water, with remarks on its accessibility to wading lapwing or golden plover and (ii) the presence of livestock.

4. Record the presence and condition of the bird control kite. Earmark any kites that need replacement for notification to the wind farm operator.

5. Record the presence, number, activity and habitat of any lapwing or golden plover encountered. Also record flights of lapwing or golden plover overhead, noting the distance from the nearest mitigation fields and nearest turbines.

Adherence to Growing Schedule

Adherence to the Growing Schedule actions will be monitored each year during field inspections. In the event where the Growing Schedule is not being implemented in a mitigation field, the wind farm operator will be alerted by the overseeing environmental scientist, ornithologist or ecologist in a timely manner. Incomplete actions will be discussed with the wind farm operator with the aim of resolving the issue with the landowner.

Assessment of Growing Schedule

The findings of the field inspection will be assessed each year after the field visit to monitor the effectiveness of the actions. In the event that optimum habitat for lapwing and golden plover is still available in a mitigation field after the Growing Schedule actions have been completed, the overseeing environmental scientist, ornithologist or ecologist will recommend a new strategy for the individual field. This strategy will be communicated to the wind farm operator and landowner in a timely manner.

Reporting

The findings and results of mitigation field monitoring and evaluation, and a discussion on the effectiveness of the Bird Mitigation Plan will be reported in the Bird Monitoring Programme report that will be submitted to the Planning Authority and National Parks and Wildlife Service at the end of each prescribed monitoring year. This report will be available on request by the National Parks and Wildlife Service or the Local Authority. The report should include any additional associated recommendations to be incorporated into the Bird Mitigation Plan.

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