Chapter 6
Ornithology

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6 Ornithology

6.1 Executive Summary

6.1.1 A full suite of ornithological surveys was adopted for the purposes of assessing the avian baseline conditions for the Proposed Development. The surveys comprised: Vantage Point (flight activity) surveys, breeding bird surveys, breeding Schedule 1 species surveys and black grouse surveys; all surveys were undertaken from April 2021 to March 2024.

6.1.2 Seven species of raptor of higher conservation value were registered within the site during the Vantage Point and walkover surveys, of which peregrine and red kite were assessed as breeding, but over 2 km from the site. Seven species of waders were recorded, with five assessed as breeding in the site or 500 m survey buffer.

6.1.3 Levels of flight activity recorded at risk height were considered to be low for all target species, with the most frequently recorded species, curlew, registered on seven occasions. Collision risk modelling was undertaken for species with recorded flight time at risk height, namely: curlew, golden plover, goshawk, osprey, peregrine and red kite.

6.1.4 An assessment of ornithology effects arising from the construction and operation of the Proposed Development was undertaken, based on the proposed wind turbine layout and dimensions for a candidate turbine plus the proposed layout for the solar array and Battery Energy Storage Systems (BESS) and associated infrastructure. Through a standardised evaluation method, Important Ornithological Features were identified and brought forward for assessment if concluded to be vulnerable to effects.

6.1.5 Important Ornithological Features taken forward for further consideration were Muirkirk Uplands SSSI: Breeding Bird Assemblage (including curlew and snipe), the Dungavel Wind Farm Habitat Management Plan Areas (DHMPA) hen harrier mitigation, and waders (breeding lapwing and oystercatcher).

6.1.6 In accordance with guidelines, the impact assessment assumed the application of standard mitigation measures. With these in place, predicted effects were considered to be negligible or minor adverse and therefore not significant for all Important Ornithological Features, with the exception of a moderate effect on the DHMPA.

6.1.7 The Applicant has committed to additional mitigation and enhancement measures to further reduce adverse effects, and introduce biodiversity enhancements. Measures include the implementation of an extensive Habitat Management and Enhancement Plan (HMEP) which will improve current, and create new, foraging and breeding habitats for Important Ornithological Features, in particular hen harrier and breeding waders. The HMEP will also lead to improved habitats for a broad range of other species including merlin and short-eared owl.

6.1.8 Residual effects, which take account of additional mitigation and enhancement measures, are predicted to largely remain the same as the predicted effects, bar for Muirkirk Uplands SSSI: breeding bird assemblage and breeding waders for which residual effects are predicted to be minor beneficial and minor-moderate beneficial for the Dungavel HMPA (hen harrier).

6.1.9 With no significant residual adverse effects predicted on any Important Ornithological Features, no cumulative assessment was deemed a requirement.

6.1.10 Given the presence of a site of international importance (*i.e.* a European designated site), Muirkirk & North Lowther Uplands Special Protection Area (SPA), within 10 km of the site, a (shadow) Habitats Regulations Assessment (HRA) has been carried out. This has concluded no likely significant adverse effects on the integrity of the SPA as a result of the Proposed Development.

6.2 Introduction

6.2.1 This chapter considers the potential effects of the Proposed Development on ornithology. It details the ornithology baseline conditions and identifies Important Ornithological Features (IOFs) active within and connected to the site. An Ornithological Impact Assessment is then carried out for IOFs which may be vulnerable to effects resulting from the construction, operation and/or decommissioning of the Proposed Development.

6.2.2 The Ornithology chapter should be read with reference to the Proposed Development description in **Chapter 3**, as well as other chapters as referenced throughout. This chapter relates entirely to ornithology. Refer to **Chapter 7** for the non-avian ecology assessment.

6.2.3 This chapter is supported by the following figures and technical appendices:

Figures

- Figure 6.1: Viewpoint Locations and Viewsheds
- Figure 6.2: Survey Areas
- Figure 6.3: Ornithology Designations

Technical Appendices

- Technical Appendix 6.1: Ornithology Technical Report (including Technical Appendix 6.1 Figures 1 to 7)
  - Confidential Annex 6.1 (Confidential Annex Figures 1 to 5)
- Technical Appendix 6.2 Collision Risk Modelling Report (including Technical Appendix 6.2 Figures 1 and 2)
- Technical Appendix 7.5: Outline Habitat Management and Enhancement Plan (including Technical Appendix 7.5 Figure 1 which is confidential and found in the EIA Report Confidential Annex)

6.3 Legislation, Policy and Guidelines

Legislation

6.3.1 Relevant legislation has been reviewed and taken into account as part of this assessment. Of particular relevance are:

- Council Directive 2009/147/EC on the conservation of wild birds (the Birds Directive); as transposed into Scots law by The Conservation (Natural Habitats &c.) Regulations 1994;
- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (the EIA Regulations);
- The Conservation of Habitats and Species Regulations 2017, as amended in Scotland by the Conservation (Amendment) (EU Exit) Regulations 2019;
- The Wildlife and Countryside Act (WCA) 1981 (as amended);
- The Wildlife and Natural Environment (Scotland) Act 2011 (as amended); and
- The Nature Conservation (Scotland) Act 2004 (as amended).

Planning Policy

6.3.2 The Planning Statement associated with this Section 36 application sets out the planning policy framework that is relevant to the EIA. Of relevance to the assessment presented within this chapter, regard has been had to the following policies:

- National Planning Framework 4 (Scottish Government, 2023);
- Planning Advice Notes (PANs) 60: Planning for Natural Heritage provides guidance relevant to this assessment and the Proposed Development;
- The South Lanarkshire Local Development Plan (South Lanarkshire Council, 2021); and
- The East Ayrshire Local Development Plan (East Ayrshire Council, 2024).

Guidance

6.3.3 Current best practice guidance on assessing ornithological interests in relation to onshore wind farm developments was followed. A full description of relevant guidance is presented in Technical Appendix 6.1; however, of relevance to ornithology are the following:

- Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2018);
- Survey Methods for Use in Assessing the Impacts of Onshore Wind Farms on Bird Communities (Scottish Natural Heritage (SNH) (now NatureScot), 2017);
- Windfarms and Birds: Calculating a Theoretical Collision Risk Assuming No Avoiding Action (SNH, 2000);
- Guidance on using an updated collision risk model to assess bird collision risk at onshore wind farms (NatureScot, 2024);
- Use of Avoidance Rates in the SNH Wind Farm Collision Risk Model (SNH, 2018a);
- SNH (2018b). Assessing Significance of Impacts from Onshore Windfarms on Birds outwith Designated Areas (2014, updated 2018). SNH Information and Guidance Note. SNH, Battleby;
- Developing Field and Analytical Methods to Assess Avian Collision Risk at Wind Farms (Band *et al*. 2007);
- Assessing the Cumulative Impacts of Onshore Wind Farms on Birds (SNH, 2018);
- Good Practice During Wind Farm Construction. 4th Edition (NatureScot, 2024);
- Disturbance Distances Review: An Updated Literature Review of Disturbance Distances of Selected Bird Species (Goodship and Furness, 2022);
- The Scottish Biodiversity Strategy, with Scottish priority species and habitats listed on the Scottish Biodiversity List (SBL), based on the former UK Biodiversity Action Plan (UK BAP), and regional biodiversity targets defined through the Highland Local Biodiversity Action Plan (LBAP) Highland Council, 2021); and
- Stanbury *et al*. (2021), Birds of Conservation Concern (BoCC): the 5th Population Status of Birds in the United Kingdom, Channel Islands and the Isle of Man.

6.4 Consultation

6.4.1 **Table 6.1** provides details of consultations undertaken with relevant statutory and non-statutory organisations, together with action undertaken by the Applicant in response to consultation comments.

Table 6.1 - Consultation Relevant to Ornithology

Consultee	Key Consultee Comments	Application Action
East Ayrshire Council 13 March 2024	The Planning Authority would note its comments from the previous scoping response (22/0003/S36SCP) remain valid unless otherwise updated herein based on the revised Phase 1 proposal currently under scoping consideration. The above-noted previous scoping response, dated 25/10/2022, noted, "*…no particular comments to make with regards to ornithological matters and would suggest the Applicant ensure the requirements and requests of NatureScot and RSPB and any other relevant body with information and records of relevant ornithological interests are taken into account to inform the assessment of these matters for reporting within the EIA Report*."	Consultation responses from NatureScot and RPSB have been appropriately considered and addressed as set out below.
NatureScot (NS) 20 March 2024	While Phase 1 of the proposal removes previously proposed infrastructure from within the Muirkirk & North Lowther Uplands Special Protection Area (SPA) , there remains a connection between the proposal and the SPA's qualifying interests by virtue of its location on surrounding land within the core breeding season foraging ranges of the site's qualifying interests. This proposal therefore has the potential to have a significant effect on all of the qualifying interests of the Muirkirk & North Lowther Uplands SPA. Consequently, Scottish Ministers, as competent authority, will be required to carry out an appropriate assessment in view of the site's conservation objectives for is qualifying interests.	Information to inform an appropriate assessment with specific reference to the qualifying interests of the Muirkirk & North Lowther Uplands SPA is included as part of the assessment below (**Section 6.15**).
	NS proposes to carry out an appraisal to inform the assessment. The EIA Report must therefore contain the information required to undertake this appraisal in view of the site's conservation objectives for its qualifying interests. This should include information on, and an appraisal of, the following: • Collision risk to SPA qualifying species and how this may affect the viability of the relevant species' population. This should include consideration of how collision risk may be influenced by forest or habitat	All the required information requested on collision risk, qualifying habitats, disturbance / displacement and cumulative impacts on qualifying interests of the Muirkirk & North Lowther Uplands SPA are included in the assessment below. Suitable habitat management measures to reduce the suitability of open ground around turbines for nesting is provided

Consultee	Key Consultee Comments	Application Action
	management proposals resulting from the windfarm development (*e.g*. through the creation of additional areas of suitable nesting habitat within the wind farm site post-construction). For this proposal, NS consider that it will be important to show the proposed turbine locations close to the SPA can allow for appropriate micro-siting and any habitat management that may needed to reduce the suitability of open ground around the turbines for nesting. • Impacts on habitats supporting the qualifying species. • Disturbance and/or displacement of SPA qualifying species as a result of construction, operation and/or decommissioning of the development. Allowing an appropriately sized buffer strip of trees to be retained between the turbines and the SPA boundary may assist in reducing the risk of displacement. • Cumulative impacts.	for within the HMEP in **Technical Appendix 7.5**.
	In respect of the North Lowther Uplands SSSI, the site lies between approximately 3 km and 5 km from any aspect of the proposed development (abnormal load proposed transport route). As such, the proposed development is unlikely to impact on the notified features of this site, with the potential exception of indirect effects on the golden plover and merlin components of its breeding bird assemblage.	The North Lowther Uplands SSSI lies over 9km from the site and nearly 4 km from the proposed southern abnormal load transport route option. The proposed transport route option is a busy road regularly used heavily by farm and other industrial vehicles. At nearly 4 km from the SSSI at its closest point, it is considered that the impacts of the additional traffic will be negligible and as such North Lowther Uplands SSSI is scoped out of the assessment.
	The proposed development also overlaps with, or is close to, existing wind farm sites where Habitat Management Plans (HMP) are in place (notably Dungavel Wind Farm, but also Kype Muir Extension and areas within the existing Hagshaw Cluster). The implications of this – for both the species/habitats being manged under these plans and their function in relation to the relevant consents - will require to be addressed in the iterative development of the proposal and within the EIA Report. In particular, the relationship between the proposed development and the commitments to habitat enhancement for hen harrier within the Dungavel Wind Farm HMP will require robust consideration, given that there appears to be both potential	The potential impacts on the Dungavel Wind Farm HMP are covered within the assessment, and within **Chapter 7** and **Technical Appendix 7.5**. Kype Muir Extension HMP lies to the east of the Proposed Development site but is predominantly detailed for habitats only (the only mention of ornithology is to discourage the presence of birds from within the array). The Kype Muir Extension HMP does detail some habitat work in terms of tree removal which as a result is considered to improve foraging

Consultee	Key Consultee Comments	Application Action
	conflict and duplication between the proposal and this HMP.	conditions for hen harrier in proximity to the SPA. The likelihood of the Proposed Development having any impacts on the Kype Muir Extension HMP area is very low and is not considered further in the assessment. Any impacts on hen harrier in this area are also considered very unlikely but these impacts are considered within the assessment as part of the SPA hen harrier population and not the Kype Muir Extension HMP itself. The other HMPs including Bankend Rig are located at distances of over 2 km from the site and as such no impacts are predicted.
RSPB 10 May 2024	Section 7.6 of the Scoping Update Report and Table 7.25 (Receptors and Impacts Scoped In and Out) states that operational impacts through collision risk and disturbance/displacement will be assessed through the EIA. We recommend that this includes impacts through permanent operational displacement for all target species as well as temporary impacts through disturbance during construction.	The impacts of permanent operational displacement and temporary construction disturbance are included in the assessment.
	Section 7.2.1 in the Scoping Update Report describes the baseline for this proposal and confirms that the northern development area of the proposal is situated in commercial forestry. However, we are aware that the location of proposed turbines within this area will conflict with an area that has been subject to habitat management as part of a condition for consent of the operational Dungavel wind farm. Since this factor is not referenced in the Scoping Report, we assume that it has not been addressed through design considerations. We recommend that this issue is fully assessed as part of the EIA that is likely to include consideration for iterations to the infrastructure layout.	The potential impacts on the Dungavel Wind Farm HMP have been carefully considered as part of the design process and are covered within the assessment. In this regard it is important to note that much of the Dungavel Wind Farm HMP hen harrier enhancement areas within the Proposed Development site are yet to be implemented.
	RSPB Scotland has a seat on the Habitat Management Group (HMG) for the Dungavel Wind Farm HMP, and are therefore, aware that part of the original HMP area was designated to deliver enhancement for Hen Harriers. The most recent ecological report relating to the HMP (received in April 2024)	The potential impacts on the Dungavel Wind Farm HMP are fully covered within the assessment and also addressed within **Chapter 7** and **Technical Appendix 7.5**. In this regard it is important to note that much of

Consultee	Key Consultee Comments	Application Action
	concludes these original areas provide suitable habitat for ground-nesting raptors, increases the extent of suitable habitat close to the SPA, and this overall will reduce the likelihood of raptors nesting close to specified turbines within the operational Dungavel Wind Farm. However, having reviewed the proposed layout for Phase 1 of Hagshaw Energy Cluster - Western Expansion based on Figure 3.3 in the Scoping Report, we are concerned Turbines T12 and T15 are proposed to be sited within these areas of Hen Harrier enhancement. We do not think these are appropriate locations for turbines, given the role these areas play in delivering suitable nesting habitat for ground-nesting raptors, to mitigate impacts of an existing/consented wind farm as detailed in the most recent ecological report.	the Dungavel Wind Farm HMP hen harrier enhancement areas within the Proposed Development site are yet to be implemented.
SG Natural Resources Division 25 March 2024	As the Scoping Update Report notes, part of the proposed development site overlaps [existing B743 road only] with the Muirkirk and North Lowther Uplands Special Protection Area (SPA), so in addition to the requirements for an EIA, a Habitats Regulations Appraisal (HRA) will also be required.	The Shadow HRA is presented in **Section 6.15**.

6.5 Assessment Methodology and Significance Criteria

Study and Survey Areas

6.5.1 The Proposed Development is split into two main development areas, with the wind turbines and alternative short duration BESS and substation located within the 'northern development area' (Dungavel Forest), and the solar, long duration BESS, short duration BESS and substation located within the 'southern development area' (Netherwood).

6.5.2 Appropriate survey areas for each specific survey were derived from best practice guidance (SNH, 2017) and are provided below:

- Flight activity Vantage Point (VP) surveys: the site boundary (at the time of survey) plus 500 m;
- Breeding bird survey (BBS) / wintering walkover survey (WBS): the Proposed Development plus 500 m (BBS Survey Area / WBS Survey Area);
- Breeding Raptor species survey: the Proposed Development plus 2 km (Breeding Raptor Survey Area); and
- Black grouse survey: the Proposed Development plus 1.5 km (BK Survey Area).

Desk Study

6.5.3 A desk study was undertaken to identify baseline data for the Proposed Development site and wider area.

6.5.4 The desk study aims to identify international designations such as Special Protection Area (SPAs) and Ramsar wetlands within 10 km of the site and national statutory designations such as Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs) or Marine Nature Reserves (MNRs) within 5 km of the site boundary, extending to 20 km for SPAs designated for species of geese. Any Local Nature Conservation Sites (LNCSs) or non-statutory designations, such as Local Biodiversity Sites, were identified within a 2 km distance of the site boundary.

6.5.5 Data was received from the South Strathclyde Raptor Study Group (SSRSG) for all records of SPA qualifying raptors held by SSRSG for the SPA.

6.5.6 The Local Biological Recording Group, namely South west Scotland Environmental Information Centre (SWSEIC) was contacted for all records of ornithology species within the site and 2 km buffer for the last ten years (2014-2024).

6.5.7 In addition, existing records that are freely available for commercial use of protected or otherwise notable species (*e.g*. SBL/LBAP priority species) were identified with a 5 km distance of the site boundary. Records from the last 10 years were considered relevant to the study. Only those relating to birds are relevant to the assessments presented in this chapter. Relevant chapters and post-construction monitoring information for wind farm applications in proximity to the site, including Dungavel Wind Farm and Bankend Rig 3 Wind Farm, were accessed via the planning portal to provide additional information on breeding and flight activity of key species.

6.5.8 Data for priority / notable species and designated sites were obtained from the following databases:

- National Biodiversity Network (NBN) Atlas;
- NatureScot SiteLink;
- Scotland's Environment Interactive Map; and
- MAGIC: Nature on the Map.

Field Surveys

6.5.9 The scope of the ornithology surveys, including field survey methods and VP locations, was developed and agreed with NS, taking cognisance of current best practice guidance (SNH, 2017). Surveys were carried out at a variety of times and in different weather conditions to ensure data were collected that were fully representative of a range of behaviour patterns throughout the different environmental conditions experienced at the site.

6.5.10 All surveys were undertaken by suitably qualified and experienced ornithologists including members of the SSRSG that completed all raptor surveys.

6.5.11 NS guidance (SNH, 2017) recommends that wind farm assessments should focus on 'target species'. The guidance defines ornithological target species as:

- Those protected under Schedule 1 of the Wildlife & Countryside Act 1981 (as amended);
- Those listed on Annex 1 of the Council Directive 79/409/EEC on the Conservation of Wild Birds;
- Regularly occurring migratory species which are either rare, vulnerable or warrant species consideration on account of the proximity of migration routes, or breeding, moulting, wintering or staging areas is relation to the proposed wind farm; and
- Species occurring at the site in nationally or regionally important numbers.

6.5.12 The NatureScot guidance highlights that consideration should be given to species of local conservation concern (*i.e*. those listed in LBAPs), but that target species should be restricted to those likely to be affected by wind farms.

6.5.13 Previous experience of similar projects in the local area identified that survey work to inform the assessment should account for the potential presence of 'scarce' diurnal raptors, wildfowl and wading bird species within and adjacent to the site.

6.5.14 A summary of the ornithological methods adopted is provided below. Please refer to **Technical Appendix 6.1** for the full details.

6.5.15 The ornithological surveys commenced in April 2021 until March 2024. The initial 2021 site boundary (wider area) was significantly larger than the site included in the final Proposed Development boundary and included the large open area within the SPA between the northern and southern development areas (**Figure 6.2**).

Vantage Point Surveys

6.5.16 Flight activity surveys were undertaken over two breeding seasons and two non-breeding seasons. NatureScot guidance (SNH, 2017) advises that VP locations should be selected to achieve maximum visibility from the minimum number of survey locations. In this survey method, an arc of up to 180 degrees and extending to 2 km from the observer can be surveyed from each VP, subject to topography, vegetative screening and any other constraints to effective survey. A minimum of 36 hours of survey effort was completed at each VP during each of the breeding season and winter periods, and the timing of VP watches varied to ensure that all times of day were covered.

6.5.17 A total of four of the selected VPs (VP9-12– refer to Figure 7.3 within the Scoping Update Report (**Technical Appendix 4.3**)) covered the northern development area. Locations followed a review of aerial imagery and Ordnance Survey maps, then confirmed (and later approved by NS) through ground-truthing when the locations were micro sited to the optimal locations. The locations of the four VPs and their respective viewsheds are presented in **Figure 6.1**.

6.5.18 At each of VP9-VP11, surveys were completed over 24 months, from April 2022 to February 2024. A total of 36 hours was undertaken at each VP during each of the two breeding seasons and a total of 36 hours per VP during each of the two non-breeding seasons, which equates to a total of 144 hours at each VP over the 24-month survey period. VP12 was added in April 2023 and a full year (72 hours) was completed in February 2024.

6.5.19 The results of a fifth VP which covered the southern development area (VP3) undertaken between May 2021 and March 2023 are also used to inform the assessment. Surveys at VP3 were completed from May 2021 to March 2023, comprising 36 hours during each of the two breeding seasons, and 36 hours during each of the two non-breeding seasons (144 hours in total over the two-year survey period).

6.5.20 VP watches were conducted for periods of no longer than three hours in a single watch. A minimum 30-minute break was observed between watches to allow the surveyor an adequate rest time between VP watches.

6.5.21 Full details of the survey methodology are outlined in **Technical Appendix 6.1** and the survey timings, dates and weather detailed in **Technical Appendix 6.1** Annex A: Table A1.

Winter Walkover Survey

6.5.22 A wintering bird survey programme was completed between October 2022 and March 2023 and consisted of six visits. The surveys comprised a combination of a walkover survey and dusk vantage point surveys. The dusk vantage point surveys were specifically placed to cover sections of habitat considered suitable for roosting hen harrier in areas that were not covered by VP surveys and within 2 km of the site boundary. Surveys took place within the sections of the SPA within 2 km of the Northern Development Area during the 2023-2024 winter season.

6.5.23 Due to the lack of significant waterbodies or wetland habitats that would attract wintering waterfowl and waders, the winter walkover prioritised the potential for roosting locations for hen harrier and short-eared owl.

6.5.24 Winter walkover surveys followed the guidelines outlined in Gilbert *et al*. (2011) and full details of the survey dates and methodology are outlined in **Technical Appendix 6.1**.

Breeding Bird Survey

6.5.25 Breeding bird surveys were conducted within the site boundary and 500 m survey buffer within accessible areas of land ownership or public rights of way (PROW) in 2022 to 2023 (see **Figure 6.2**). A survey of the wider area was conducted between May and July 2021 and provided additional data for that wider area, but that earlier survey did not include the northern development area itself as it was not part of the development proposals being considered at that time. In open areas of the BBS Survey Area, a walkover technique based on the Brown and Shepherd (1993) method was employed and involved approaching within 100 m of all parts to record the presence of breeding waders. In addition, during the 2023 breeding season a breeding bird walkover covering all accessible tracks and forest rides within the Dungavel plantation forest (northern development area) was conducted across four survey visits, with all species of conservation concern recorded.

6.5.26 NatureScot guidance (SNH, 2017) states that four survey visits should be completed over the breeding season, based on recommendations set out in Calladine *et al*. (2009). Both the 2022 and 2023 surveys included a total of four survey visits, conducted during the period April to July, inclusive, with a minimum two-week gap between survey visits. Full details of the survey dates and methodology are outlined in **Technical Appendix 6.1**.

Breeding Schedule 1 Species Survey

6.5.27 Breeding Schedule 1 species surveys were conducted of the Schedule 1 Species Survey Area (see **Figure 6.2**). Surveys were conducted for nesting Schedule 1 species of raptor and owls from April to August in 2021, 2022 and 2023.

6.5.28 The survey methods followed Hardey *et al*. (2013) and Gilbert *et al*. (2011) in general involving four survey visits (minimum of two weeks apart) walking transect routes focusing on suitable habitat. Habitat, such as any prominent features like rock outcrops or fence lines were checked for raptor species within the site and a 2 km survey buffer. Full details of the survey dates and methodology are outlined in **Technical Appendix 6.1**.

Black Grouse surveys

6.5.29 Due to the presence of suitable habitat for breeding black grouse, dedicated black grouse surveys were undertaken in April and May 2022 covering all suitable habitat within the site and accessible areas of the 1.5 km Survey Area buffer as recommended in SNH (2017). The survey methods followed those recommended by Gilbert *et al*. (2011), with full details of the survey dates and methodology described in **Technical Appendix 6.1**.

Survey Limitations

6.5.30 Full access was available onto the site and the majority of the immediate surrounding area throughout the survey period. Where access in the wider survey area buffers was restricted, these areas were scanned from suitable vantage points using binoculars. As such, no significant limitation to the surveys were noted.

Assessment of Potential Effect Significance

6.5.31 The approach to the impact assessment follows the Chartered Institute of Ecology and Environmental Management guidelines (CIEEM, 2018), which prescribe an industry-standard method to define, predict and assess potential ecological effects of a proposed development. Starting with establishing the baseline through a mix of desk study and field surveys, IOFs are first identified and then evaluated in terms of their vulnerability to the Proposed Development through a reasoned process considering factors such as statutory requirements, policy objectives for biodiversity, conservation status of the IOF, connectivity and spatial separation from the Proposed Development. An impact assessment is then undertaken for scoped-in IOFs that assumes construction industry-standard mitigation will be followed to ameliorate effects as far as practicably possible. Additional mitigation strategies can then be determined to minimise any residual effects that will otherwise be experienced by the IOF and any opportunities for enhancement identified.

6.5.32 In summary, the impact assessment process (CIEEM, 2018) involves:

- Identifying IOFs vulnerable to impacts;
- Identifying and characterising impacts and their effects;
- Incorporating measures to avoid and mitigate negative effects;
- Assessing the significance of any residual effects after mitigation;
- Identifying the appropriate compensation methods to offset significant residual effects; and
- Identifying opportunities for ecological enhancement.

6.5.33 When there is the potential for the Proposed Development to have an effect on a bird species or population that may be part of, or linked to, a designated site population, whether internationally such as a SPA or Ramsar population, or nationally, such as a SSSI population, impacts are assessed on whether they affect the integrity of the designated site and, as such, the conservation objectives or management objectives of the designation.

6.5.34 The species' link to the designated site may be throughout the year but as detailed in the site citation documentation, it may be specific to the species' activity or the time of year. For example, the designated site may be designated solely for its breeding, wintering, passage or migratory species meaning at other times of year, these species have no link to the designated site. In the situation where the bird population recorded is not considered to be protected by a designation such as an SPA, Ramsar or SSSI, the individuals are considered to be part of the 'wider area population' and in this scenario the assessment concentrates on whether there are effects on the overall population of the species in both a local (Natural Heritage Zone – NHZ 19 (Western Southern Uplands and Inner Solway) and wider area (Scotland) context.

6.5.35 The significance of the effect on an ornithological feature is determined by assessing the following three factors:

- The Nature Conservation Importance (NCI) of the species;
- The conservation status of the species; and
- The magnitude of the impact.

Nature Conservation Importance

6.5.36 Determination of the level of sensitivity of an IOF (CIEEM, 2018) to be taken forward for assessment is based on a combination of the feature's NCI and its conservation status.

6.5.37 **Table 7.2** lists the criteria used to determine the NCI value assigned ornithological features.

Table 6.2 - Evaluation Criteria for NCI

Importance	Criteria
High	Populations of species receiving protection due to their inclusion as designated features of a SPA, proposed SPA (pSPA), Ramsar or SSSI including birds outside of protected areas when there is considered to be connectivity to the site. Breeding species listed on Schedule 1 of the WCA.
Medium	Presence of target species listed on Annex I species of the Birds Directive but not considered to be protected by a designated site. More than infrequent presence of target species (but not breeding) listed on Schedule 1 of the WCA. A Natural Heritage Zone – NHZ 19 (Western Southern Uplands and Inner Solway) scale important population / area of a bird species listed on the SBL (Scottish Government, 2013) as requiring conservation action.

Importance	Criteria
	The presence of NHZ19 scale population of breeding species noted on the latest BoCC Red-listed species (Stanbury *et al*., 2021). Populations of species mentioned as part of a non-statutory designation when there is considered to be connectivity to the site. The presence of significant number of migratory, passage or wintering species, notable due to using the site as a staging post, wintering grounds or notable migration route.
Low	All other species not mentioned in categories above.

Conservation Status

6.5.38 For these purposes, conservation status was taken to mean the sum of the influences acting on a population which may affect its long-term distribution and abundance. The conservation status of a species is defined by NatureScot (SNH, 2018) as "*the sum of the influences acting on it which may affect its long-term distribution and abundance, within the geographical area of interest*" and they state that:

> *"A species' conservation status is favourable when:*
>
> - *population dynamics indicate that the species is maintaining itself on a long-term basis and is therefore likely to persist in the habitat it occupies;*
> - *the natural range of the species is not being reduced, nor is likely to be reduced for the foreseeable future; and*
> - *there is (and will probably continue to be) a sufficiently large habitat to maintain its populations on a long-term basis.*
>
> *We recommend here that the concept of favourable conservation status of a species should be applied at the level of its Scottish population, to determine whether an impact is sufficiently significant to be of concern."*

6.5.39 Where possible, the conservation status for each species population was considered within the appropriate NHZ level (NHZ 19: Western Southern Uplands and Inner Solway); however, for population estimates, if sufficient information on these populations does not exist, the national (Scottish) population estimate was used. For wintering or migratory species, the national (Scottish) population was considered.

Magnitude

6.5.40 For the purposes of this assessment, magnitude of impact was determined by consideration of the spatial and temporal nature of each impact. The levels of spatial magnitude on an ornithological feature are categorised as 'negligible', 'low', 'medium', 'high' or 'very high', based on the definitions in **Table 6.3**, below, with the temporal impacts categorised in **Table 6.4.**

Table 6.3 - Levels of Spatial Magnitude of Impact

Spatial Magnitude	Description
Very High	Total/near total loss of a bird population due to mortality or displacement. Guide: >80 % of regional (NHZ19) population affected.
High	Major reduction in the status or productivity of a bird population due to mortality, displacement or disturbance. Guide: 21-80 % of regional (NHZ19) population affected.

Spatial Magnitude	Description
Medium	Partial reduction in the status or productivity of a bird population due to mortality, displacement or disturbance. Guide: 6-20 % of regional (NHZ19) population affected.
Low	Small but discernible reduction in the status or productivity of a bird population due to mortality, displacement or disturbance. Guide: 1-5 % of regional (NHZ19) population affected.
Negligible	Very slight reduction in the status or productivity of a bird population due to mortality, displacement or disturbance. Reduction barely discernible, approximating to the 'no change' situation. Guide: <1 % of regional (NHZ19) population affected.

Table 6.4 – Levels of Temporal Magnitude of Impact

Temporal Magnitude	Description
Immediate	Within approximately 12 months
Short term	Within approximately 1-5 years
Medium term	Within approximately 6-15 years
Long term	Between 15-40 years
Permanent	Over 40 years (impacts broadly spanning longer than the lifetime of the scheme, for the purpose of this assessment over 40 years).

Temporal Scope

6.5.41 Potential impacts on ornithological features have been assessed in the context of how the predicted baseline conditions within the relevant survey area might change between the surveys and the start of construction. It is anticipated that construction would take approximately 24 months to complete and would be expected to commence in c.2027 and that the baseline conditions will not materially change in the intervening time period.

Determining Potentially Significant Effects

6.5.42 An assessment is undertaken in relation to the baseline conditions that would be expected to occur in the absence of a development and, therefore, may include possible predictions of future changes to baseline conditions, such as environmental trends and other completed or planned development. Both adverse and beneficial impacts/effects are possible.

6.5.43 A significant effect, in ornithological terms, is defined as an effect (whether negative or positive) on the conservation status of a species within a given geographical area, including cumulative impacts.

6.5.44 Following the classification of each species NCI and consideration of the magnitude of each impact, professional judgement is used to make a reasoned assessment of the likely effect on the conservation status of each potentially affected species.

6.5.45 In accordance with the EIA Regulations and good practice, each likely effect is evaluated and classified as either significant or not significant. The significance levels of effect on bird populations are described in **Table 6.5**. Detectable changes, *i.e.*, those of 'major' or 'moderate' significance, in the conservation status of regional populations of NCI are considered to be significant effects under the EIA Regulations. Non-significant effects are those which are likely to result in barely detectable (minor) or non-detectable (negligible) changes in the conservation status of regional bird populations.

Table 6.5 - Levels of Significance of Effect

Significance of Effect	Description
Major	A detectable change to regional populations, resulting in total population loss or severe impacts to their conservation status.
Moderate	A detectable change to regional populations, resulting in population losses that are likely to impact their conservation status.
Minor	Small or barely detectable changes to regional populations, that are unlikely to impact their conservation status.
Negligible	No or barely discernible changes to regional populations, with no impact on their conservation status.

6.5.46 In accordance with the current CIEEM guidelines, effects of impacts are assessed in the presence of standard mitigation measures. Additional mitigation may be identified where it is required to reduce a significant effect. Any significant effect remaining post-mitigation (the residual effect), together with an assessment of the likelihood of success of the mitigation, are the factors to be considered against legislation, policy and development control in determining the application.

6.5.47 Ornithological enhancement measures are also put forward, which combined with ecological enhancement measures, as set out in the Outline Habitat Management and Enhancement Plan (refer to **Appendix 7.5**), are predicted to achieve demonstrable biodiversity enhancements, in line with Policy 3 of NPF4.

6.5.48 In addition to determining the significance of effects on IOFs, this chapter also identifies any legal requirements in relation to wildlife, most notably due to disturbance caused by construction activities.

6.5.49 It is important to note what level of effect is considered 'significant' in EIA terms, which is considered to be 'moderate' and above for the purposes of this assessment, although there is some flexibility/professional judgement, in which case that is explained.

6.6 Baseline Conditions

Nature Conservation Designations

6.6.1 Information gathered during the desk study exercise identified a single site of international importance (Muirkirk and North Lowther Uplands SPA) within 20 km of the site. The component Muirkirk Uplands SSSI is the only site of national importance within 5 km of the site.

Table 6.6 - International Statutorily Designated Sites - Qualifying Features

Feature	Scientific Name	Condition (if provided)	Description (data from NatureScot, 2024)
Muirkirk and North Lowther Uplands SPA			
Breeding hen harrier	Circus cyaneus	Unfavourable Declining	Between 1994 and 1998, an average of 29.2 breeding females, 6% of the GB population. In 2024 (and several years previous), SSRSG identified no breeding pairs in the SPA.
Non-breeding hen harrier	Circus cyaneus	Unfavourable Declining	Between 1991 and 1995, an average of 12 individuals, 2% of the GB population

Feature	Scientific Name	Condition (if provided)	Description (data from NatureScot, 2024)
Breeding short-eared owl	Asio flammeus	Favourable Maintained	between 1997 and 1998, an average of 26 pairs, 3% of the GB population);
Breeding merlin	Falco columbarius	Unfavourable No change	between 1989 and 1998, an average of 9 pairs, 0.7% of the GB population and selected as one of the most suitable sites for merlin in GB
Breeding peregrine	Falco peregrinus	Unfavourable No change	between 1992 and 1996, an average of 6 pairs, 0.5% of the GB population and selected as one of the most suitable sites for peregrine in GB
Breeding golden plover	Pluvialis apricaria	Unfavourable Declining	1999, an estimated minimum of 154 pairs, 0.7% of the GB population and selected as one of the most suitable sites for golden plover in GB

Table 6.7 - National Statutorily Designated Sites - Qualifying Features

Feature	Scientific Name	Condition (if provided)	Description (data from NatureScot, 2024)
Muirkirk Uplands SSSI			
Breeding hen harrier	Circus cyaneus	Favourable Maintained (2008)	No population details provided.
Non-breeding hen harrier	Circus cyaneus	Unfavourable Declining	No population details provided.
Breeding short-eared owl	Asio flammeus	Favourable Maintained	No population details provided.
Breeding bird assemblage	n/a	Favourable Maintained	The upland moorland bird assemblage includes teal, hen harrier, buzzard, merlin, peregrine, short-eared owl, red grouse, golden plover, dunlin, snipe, curlew, redshank, whinchat, stonechat, wheatear, and ring ouzel.

Non-Statutory designations

6.6.2 Airds Moss RSPB Reserve (also an SAC) lies 2.3 km south-west of the site and is the largest unafforested blanket bog in the South Strathclyde region and is situated within the Muirkirk Uplands between the towns of Cumnock and Muirkirk in East Ayrshire. The entire site is 8 km in length and 2.5 km wide. The bog forms part of a wider area of upland moorland within the catchment of the River Ayr. The area forms part of the SPA described above as it supports breeding and wintering hen harrier, merlin, peregrine, short-eared owl and golden plover. Over 400 ha of Airds Moss is managed as a wildlife reserve by the RSPB, who aim to improve the condition of the bog and adjacent floodplain habitats for the benefit of wild birds and other species.

Other – Habitat Management Plan (HMP) Areas

6.6.3 Part of the proposed Dungavel Wind Farm HMP Areas (DHMPA) lies within the northern development area. This component of the DHMPA was proposed to mitigate for potential impacts on ornithological receptors from the Dungavel Wind Farm, with habitat improvements aiming to benefit breeding hen harrier. The wind farm was approved in 2009 and construction was completed in 2015 however, only a relatively small part of the DHMPA works that lie within the Proposed Development northern development area have been undertaken to date (at the time of writing of this report).

Desk Study – SPA species

6.6.4 The raptor desk study identified a total of 273 breeding records for the four raptor qualifying breeding species of the Muirkirk and North Lowther Uplands SPA. Of the 273 there were 185 records for hen harrier, with the records spread between 1991 and 2015. Of the 185 records, two were recorded in the central part of the northern development area (one in 1991 and one in 2004) and two further historic records within 750 m of the northern development area, both in the same location in 2003 and 2005. There are no historic records for hen harrier within 1 km of the southern development area. There have been no confirmed breeding records in the SPA since 2015. See **Confidential Annex 6.1** Figure 4.

6.6.5 A total of 13 merlin breeding records were identified between 2005 and 2015, none of the records were within 500 m of the site. A total of 67 peregrine records between 2022 and 2020, the majority of the records are in known eyrie locations, none of which are within 2 km of the site. A total of eight short-eared owl records between 2009-2011, all the records are over 1 km from the site. See **Confidential Annex 6.1** Figure 5.

6.6.6 In addition, post construction monitoring for Dungavel Wind Farm identified a breeding record for short-eared owl in 2017 (but not in 2018), the breeding location was over 1 km from the site (RPS, 2017).

Desk Study – SWSEIC

6.6.7 The desk study provided a total of 303 records of birds including a total of 65 species within 2 km of the site between 2014-2024. The results including single records for each of the following Schedule 1 species (barn owl, barnacle goose, fieldfare, hen harrier, merlin and osprey) and two records of redwing.

6.6.8 There were a total of seven records of black grouse with six records of black grouse between 2015 and 2017 and a record of a male bird on 05 February 2025 on Goodbush Hill to the south of the northern development area.

Flight Activity Summary

6.6.9 As discussed above, a total of two years of flight activity surveys were completed at the site between April 2022 and March 2024. A summary of the results showing all target species is detailed below in **Table 6.8** which shows:

- The total number of flights recorded;
- The total number of birds recorded;
- The total number of flight seconds which are calculated for each observation as the product of flight duration and number of individuals;
- The total number of full and/or in-part flights in the Collision Risk Zone (CRZ) which is defined as flights at Collision Risk Height (CRH) within the VP viewsheds, CRH is defined as between 67 m-230 m for all turbines with the exception of T6 which is 37 m-200 m; and
- Flight seconds in CRZ.

6.6.10 For full detail on individual flights, timings and locations see **Technical Appendix 6.1**, Annex A, Tables A1-A16; Figures 1 -3 and **Confidential Annex 6.1** Figures 1-2.

Table 6.8: Target species activity recorded (VP9-VP12) during two years of flight activity surveys

Species	Total Flights	Total Count	Total Flight Seconds	Flights in CRZ	At-risk Seconds – Flight Seconds (* flights for linear) in CRZ
Common Sandpiper	2	2	84	0	-
Curlew	7	8	280	2	65
Golden Plover	3	13	1,400	3	1,300
Goshawk	4	4	283	1	10.4
Greylag Goose	2	15	144	1	1*
Hen Harrier	1	1	14	0	-
Osprey	1	1	176	1	176
Peregrine	2	2	373	2	373
Pink-footed Goose	19	884	2,400	15	15*
Red Kite	4	4	782	3	280.2
Woodcock	1	1	10	0	-
Whooper Swan	1	12	147	1	1*

Collision Risk Modelling

6.6.11 Band *et al*. (2007) devised a method by which field data on bird flight activity can be gathered and used to quantify the likelihood of bird collisions with turbines; this is known as the 'Band' Collision Risk Model (CRM).The Band CRM involves two methods to predict estimated collision fatalities, depending on the pattern of flight of the species involved: 'predictable' and 'unpredictable' flight methods. The model inputs the 'at-risk' flight seconds or number of 'at-risk' flights into the appropriate model along with a number of parameters such as the bird's biometrics, the number and types of turbines and using established, pre-defined 'avoidance rates' (the likelihood of a particular species flying into a turbine) predicts a collision risk value.

6.6.12 The model has more recently been updated and new guidance, following the same principles detailed above, was produced in December 2024. The updated guidance (NS, 2024) was followed for this assessment.

6.6.13 As part of the design process for the Proposed Development, the CRM methodology can be used to help inform the site design in two ways, firstly by helping to identify areas to avoid which were particularly sensitive in terms of flight activity (such as flight corridors) and secondly by identifying flight activity at certain heights which were significant. The collision risk model can therefore be used to mitigate by design the resultant layout, with both the location and turbine specifications being modified to reduce the impacts on sensitive bird species.

6.6.14 The collision risk modelling used a layout of 18 turbines with a standard sweep of 67 m-230 m of the rotor blades, except for T6 for which the applicable sweep is 37 m-200 m (given that the maximum tip height of T6 is proposed to be 200 m, rather than the 230 m maximum tip height applicable to the other proposed turbines). For any flights recorded within the zone of

influence of T6 (250 m buffer), the difference in turbine height was taken into account when determining which flights and the associated flight times were considered to be at potential collision height. **Table 6.9** also displays a summary of the results of this process. For full details of the workings of the CRM see **Technical Appendix 6.2**.

Table 6.9: Collision Risk Modelling Results

Species Name	Collisions -Non-breeding season	Collisions - Breeding season	Collisions -Annual	Collisions - Scheme Lifetime (40 years)	Years per collision
Curlew	0	<0.01	<0.01	n/a	n/a
Golden Plover	0.03	0.01	0.04	1.6	25
Goshawk	0	<0.01	<0.01	n/a	n/a
Osprey	0	0.01	0.01	0.4	100
Peregrine	<0.01	0.01	0.01	0.4	100
Red Kite	<0.01	0	<0.01	n/a	n/a

Raptors

Goshawk

6.6.15 Goshawk were not confirmed as breeding within the Breeding Raptor Study Area during any of the 2021-2023 breeding seasons.

6.6.16 Flight activity surveys in the northern development area recorded four goshawk flights (**Technical Appendix 6.1**, **Annex A, Table A10 and Technical Appendix 6.1: Figure 1**), of which one was identified to be 'at-risk' (**Table 6.8**), and therefore, with just 10.4 'at-risk' seconds, no significant collision risk (a mean annual collision risk of less than 0.01 at the approved 98% avoidance rate) is predicted for goshawk.

Hen Harrier

6.6.17 Flight activity surveys in the northern development area registered a single hen harrier flight (**Technical Appendix 6.1**, **Annex A, Table A5** and **Confidential Annex: Figure 1**); the flight was not identified to be 'at-risk' height (**Table 6.8**) and therefore no collision risk is predicted for hen harrier. Hen harrier were recorded twice, once in September and once in November 2022 during flight activity surveys within the southern development area (**Confidential Annex: Figure 2**);

6.6.18 No evidence of breeding activity was recorded for this species during any of the site surveys conducted and no evidence of roosting activity was recorded during any of the winter walkover surveys. The desk study provided no breeding records in the last 10 years.

Merlin

6.6.19 Merlin were not recorded during flight activity surveys in the northern development area and therefore no collision risk is predicted for merlin. Merlin were recorded on four occasions during flight activity surveys within the southern development area (**Confidential Annex: Figure 2**).

6.6.20 No evidence of breeding activity was recorded for this species during any of the site surveys conducted. The desk study provided no breeding records for this species in the last 10 years,

although post construction monitoring for Dungavel Wind Farm references a possible breeding attempt in similar locations to desk study records in 2015 during a survey in 2017 (RPS, 2017).

Osprey

6.6.21 Flight activity surveys in the northern development area recorded a single osprey flight (**Technical Appendix 6.1** Annex A, Table A12**, Technical Appendix 6.1** Figure 1); which was considered to be 'at-risk' (**Table 6.8**) and therefore, with just 176 'at-risk' seconds, no significant collision risk (a mean annual collision risk of less than 0.01) is predicted for osprey.

6.6.22 No evidence of breeding activity was recorded for this species during any of the site surveys conducted.

Peregrine

6.6.23 Peregrine was confirmed to be holding one territory within the Breeding Raptor Survey Area in a similar location in 2021, 2022 and 2023 (**Confidential Annex 6.1** Figure 3). The confirmed breeding attempt was over 5 km from the site. The desk study provided no breeding records for peregrine within 2 km of the site (**Confidential Annex 6.1** Figure 5).

6.6.24 Flight activity surveys in the northern development area recorded two peregrine flights (**Technical Appendix 6.1** Annex A, Table A6 and **Confidential Annex 6.1** Figure 1), both of which were considered to be 'at-risk' height (**Table 6.8**), with a total of predicting a mean annual collision risk of 0.01 (0.01 breeding season, < 0.01 non-breeding season at the approved 98% avoidance rate), equating to one bird fatality every 100 years (**Table 6.9**). A further seven peregrine flights were recorded from VP3, although six of the seven were over 1km from the southern development area (**Confidential Annex 6.1** Figure 2).

Red Kite

6.6.25 A single confirmed breeding record for red kite was recorded in 2022, the record was over 2 km from the site boundary but within the Breeding Raptor Survey Area (**Confidential Annex 6.1** Figure 3).

6.6.26 Flight activity surveys recorded four red kite flights (**Technical Appendix 6.1** Annex A, Table A14 and **Technical Appendix 6.1** Figure 1) of which three flights were considered to be 'at-risk' height (**Table 6.8**) with just 280.2 'at-risk' seconds, no significant collision risk (a mean annual collision risk of less than 0.01 at the approved 99% avoidance rate) is predicted for red kite (**Table 6.9**).

Waders

Common Sandpiper

6.6.27 Single probable breeding attempts for common sandpiper was recorded in the survey buffers of both the northern development area and southern development area **(Technical Appendix 6.1** Figures 6 and 7). Common sandpiper were not recorded 'at-risk' height from VP surveys; therefore, no collision risk is predicted.

Curlew

6.6.28 A single breeding record for curlew was recorded within 500 m of the northern development area in 2022, with two breeding attempts recorded in the southern development area in both 2021 and 2022 (**Technical Appendix 6.1** Figures 4, 5 and 6).

6.6.29 Flight activity surveys in the northern development area recorded seven curlew flights (**Technical Appendix 6.1** Annex A, Table A9 and **Technical Appendix 6.1** Figure 1), with just 65 'at-risk' seconds, no significant collision risk (a mean annual collision risk of less than 0.01 at the approved 98% avoidance rate) is predicted for curlew (**Table 6.9**).

6.6.30 A further 33 curlew flights totalling 84 individuals were recorded from VP3, of which 24 were within the southern development area (**Technical Appendix 6.1** Figure 3).

Golden Plover

6.6.31 Flight activity surveys in the northern development area recorded three golden plover flights totalling 13 individuals (**Technical Appendix 6.1** Annex A, Table A7 and **Confidential Annex 6.1** Figure 1), all three of which were considered to be 'at-risk' height (**Table 6.8**), with a predicted mean annual collision risk of 0.04 (0.01 breeding season, 0.03 non-breeding season at the approved 98% avoidance rate), equating to one bird fatality every 25 years (**Table 6.9**).

6.6.32 A single flight of 34 individuals was recorded from VP3 (**Confidential Annex 6.1** Figure 2). No evidence of breeding activity was recorded for this species during any of the site surveys conducted.

Lapwing

6.6.33 A total of four (2021), one (2022) and no (2023) breeding attempts were recorded for lapwing in the southern development area. (**Technical Appendix 6.1** Figures 5and 6). Lapwing were not recorded from VP surveys in the northern development area therefore, no collision risk is predicted.

6.6.34 Nine lapwing flights totalling 27 individuals were recorded in the southern development area (**Technical Appendix 6.1** Figure 3).

Oystercatcher

6.6.35 A total of between two and four breeding attempts were recorded for oystercatcher in the southern development area in 2021 and 2222 (**Technical Appendix 6.1** Figures 5 and 6). Oystercatcher were not recorded from VP surveys in the northern development area therefore, no collision risk is predicted.

6.6.36 A total of 13 oystercatcher flights totalling 22 individuals were recorded in the southern development area (**Technical Appendix 6.1** Figure 3).

Snipe

6.6.37 A single breeding attempt was recorded for snipe in the southern development area in 2022, with a single record noted in the 500 m survey buffer in 2023 and a single probable record within 500 m of the northern development area in 2023 (**Technical Appendix 6.1** Figures 4 and 6). Snipe were not recorded from VP surveys, therefore, no collision risk is predicted.

Woodcock

6.6.38 Woodcock were recorded once during flight activity surveys in the northern development area but the flights was not recorded 'at-risk' height from VP surveys; therefore, no collision risk is predicted.

Other species

Black grouse

6.6.39 A male black grouse flew high to the north of the southern development area from VP3 on 04 May 2022 (**Technical Appendix 6.1** Figure 3), the flight was recorded at 18:11 on 04 May, so presumed a bird commuting through the area and not a bird flying to and from a lek site. No evidence of black grouse was recorded during the black grouse surveys in 2022. No black grouse were flushed from the site during all breeding walkover surveys.

6.6.40 The desk study identified a total of seven records of black grouse with six records of black grouse between 2015 and 2017. There was a record of a male bird recorded on 05 February 2025 on Goodbush Hill to the south of the northern development area.

6.6.41 Historic records in the region area are limited to records of over 10 years old (a small lek Dungavel wind farm (2004), a lek of two males at Douglas West Wind Farm (2015), Hagshaw Hill Wind Farm lek of 4-6 males (2004). Historic records are mentioned west of Bankend Rig Wind Farm but no specification of dates (Wilson Renewables, 2024).

6.6.42 Post construction monitoring for Dungavel Wind Farm covered much of the same study areas as used for the Proposed Development in 2017 and 2018 and no records of black grouse were recorded (RPS, 2017 and 2018).

Wildfowl

6.6.43 A single flight of 12 whooper swan was recorded over the northern site area on 24 October 2022 from VP10 (**Technical Appendix 6.1** Figure 2). A total of 19 flights of pink-footed goose totalling 884 individuals and two greylag geese flights totalling 16 individuals were recorded from VP surveys covering the northern and southern development areas (**Technical Appendix 6.1** Figures 2 and 3). Canada goose, mallard and goosander were registered occasionally from VP surveys.

Other Species

6.6.44 Black-headed gull, common gull, great black-backed gull, herring gull and lesser black-backed gull were recorded occasionally during VP surveys with a combined total of 15 flights.

Breeding passerines

6.6.45 In addition to the species discussed above, the breeding bird surveys identified: a single Schedule 1 species (common crossbill). A total of six (non-SSSI) BoCC red-list species: cuckoo, grasshopper warbler, lesser redpoll, mistle thrush, skylark and spotted flycatcher) were recorded as holding territories within the northern development area and 500 m buffer.

6.6.46 A further nine BoCC amber-list species were recorded as holding territories within the northern development area (dunnock, dipper, grey wagtail, long-eared owl, meadow pipit, song thrush, woodpigeon, willow warbler and wren) and a further 16 common and widespread (BoCC Green listed) species were also recorded.

6.6.47 A total of eight (non-SSSI) BoCC red-list species: (grasshopper warbler, greenfinch, house sparrow, lesser redpoll, spotted flycatcher, starling, whinchat and yellowhammer) were recorded as holding territories within the southern development area and 500 m buffer.

6.6.48 A further 12 BoCC amber-list species (bullfinch, dunnock, grey wagtail, house martin, mallard, reed bunting, song thrush, stock dove, wheatear, woodpigeon, willow warbler and wren) were recorded as holding territories in the southern development area and 500 m buffer, and a further 16 common and widespread (BoCC Green listed) species were also recorded.

6.6.49 For full details and scientific names see **Technical Appendix 6.1** Annex B; Table B1.

6.7 Summary of Evaluation of Recorded Features

Table 6.10: Summary of Evaluation of Ornithological Features

Feature	Summary	NCI
Designated Sites		
Muirkirk and North Lowther Uplands SPA	The level of value follows the level of designation. Located directly adjacent to the site and designated breeding golden plover, hen harrier, merlin, peregrine and short-eared owl and non-breeding hen harrier. Golden plover, hen harrier, merlin and short-eared owl were not recorded as breeding during all surveys at the site. Peregrine were recorded as breeding but outside the SPA and over 5 km from the site. Hen harrier were recorded occasionally during non-breeding season surveys. Therefore the following recorded species are considered to be of SPA provenance:- • Non-breeding hen harrier.	High

Feature	Summary	NCI
Muirkirk Uplands SSSI	The level of value follows the level of designation. Located directly adjacent to the site and designated breeding bird assemblage, hen harrier and short-eared owl and non-breeding hen harrier. • Hen harrier and short-eared owl are considered part of the higher SPA designation, therefore the following are considered to be of SSSI provenance:- • Breeding bird assemblage (including curlew, snipe, skylark).	High
Airds Moss RSPB Reserve (also an SAC)	The level of value follows the level of designation (see **Table 6.2**).	Medium
Neighbouring Wind Farm Habitat Management Areas		
Dungavel WF Habitat Management Plan Areas (DHMPA)	Partly overlaps with the northern development area. The habitat management was included as part of the approval for Dungavel Wind Farm, constructed in 2015, although only a relatively small proportion of works within the northern development area have progressed to date. These areas of DHMPA were originally proposed for improved habitats for black grouse and hen harrier.	Medium
Wildfowl		
Whooper swan	Whooper swan is fully protected as a Schedule 1 species. BoCC Red list species. Single flight across two years of survey.	Low
Greylag goose	Infrequently recorded, not recorded as a breeding species. BoCC Amber listed species.	Low
Pink-footed goose	Commonly recorded on passage over site in winter months. BoCC Amber listed species.	Low
Other wildfowl	Mallard and goosander are BoCC Amber listed.	Low
Raptors and owls		
Goshawk	Goshawk is fully protected as a Schedule 1 species. Goshawk is considered to be at risk from wind farms in NatureScot guidance (SNH, 2018b). No breeding records and a total of one flight considered 'at-risk'.	Low
Hen harrier (wider area population)	Hen harrier is fully protected as a Schedule 1 species. It is also listed in Annex 1 of the Birds Directive and as outlined above is designated as a breeding and wintering species for Muirkirk and North Lowther Uplands SPA. Hen harrier is considered to be at risk from wind farms in NatureScot guidance (SNH, 2018b). Given hen harrier is designated as breeding and non-breeding species as part of the SPA, the only wider area records would involve flight activity during the breeding season from non-breeding birds. There were two records of birds recorded	Low

Feature	Summary	NCI
	during raptor surveys, the records were considered to be either sub adult or non-breeding individuals.	
Merlin (wider area population)	Merlin is fully protected as a Schedule 1 species. It is also listed in Annex 1 of the Birds Directive and as outlined above is designated as a breeding species only for Muirkirk and North Lowther Uplands SPA. Merlin is considered to be at risk from wind farms in NatureScot guidance (SNH, 2018b). With no breeding records between 2021 and 2023 within the Schedule 1 Study Area, all records are considered part of the wider area population only. There were no records of merlin were recorded from VP surveys at northern development area and occasional records on the fringes of the southern development area.	Low
Osprey	Osprey is fully protected as a Schedule 1 species. It is also listed in Annex 1 of the Birds Directive. Osprey is considered to be at risk from wind farms in NatureScot guidance (SNH, 2018b). No breeding records and a total of one flight considered 'at-risk'	Low
Peregrine (wider area population)	Peregrine is fully protected as a Schedule 1 species. It is also listed in Annex 1 of the Birds Directive and as outlined above is designated as a breeding species only for Muirkirk and North Lowther Uplands SPA. Peregrine is considered to be at risk from wind farms in NatureScot guidance (SNH, 2018b). A single breeding attempt was recorded over 5 km from the site in all three years between 2021-2023. A total of two registrations of peregrine were recorded with both flights considered 'at-risk'.	Low
Red kite	Red kite is fully protected as a Schedule 1 species, Annex 1 and an SBL species. Red kite is considered to be at risk from wind farms in NatureScot guidance (SNH, 2018b). A single breeding attempt was recorded over 2 km from the site in 2022. A total of four registrations of red kite were recorded with three flights considered 'at-risk'.	Low
Waders		
Common sandpiper	A BoCC Amber listed, SBL species.	Low
Golden plover (wider area population)	Golden plover is in Annex I of the Birds Directive and as outlined above is designated as a breeding species only for Muirkirk and North Lowther Uplands SPA. Golden plover is a SBL species. Golden plover is considered to be at risk from wind farms in NatureScot guidance (SNH, 2018b).There were no records of golden plover breeding during surveys, therefore all records are considered to be wider area population birds. A total of three registrations during VP surveys all considered 'at-risk'.	Medium
Lapwing	A BoCC Red listed, SBL species.Four breeding records in southern development area in 2022. Not recorded during VP surveys in northern development area, nine flights in southern development area..	Medium

Feature	Summary	NCI
Oystercatcher	A BoCC Amber listed species. Small numbers of breeding birds in southern development area. Not recorded during VP surveys in northern development area, 13 flights in southern development area.	Low
Woodcock	A BoCC Red listed, SBL species. Not recorded as breeding, very occasional flight records and birds flushed during winter walkover.	Low
Other Species		
Black Grouse (wider area population)	A BoCC Red listed, SBL species. Black grouse is considered to be at risk from wind farms in NatureScot guidance (SNH, 2018b). No evidence of lekking black grouse recorded, no records of birds during any breeding walkovers, a single record of a male flying high north of the southern development area. The desk study identified a single wintering male bird outside the site boundary since 2017. As discussed, no historic records of leks from recent monitoring data within the previous 10 years.	Low
Gulls	Common gull and Herring gull are BoCC Red listed species. Lesser black-backed gull, Great black-backed gull, black-headed gull are BoCC Amber list species. Recorded infrequently during VP surveys. No evidence of breeding.	Low
Breeding BoCC Red and Amber list (wider area population) passerines	As detailed above a total of six (non-SSSI) BoCC red-list species:, nine BoCC amber-list species and a further 16 common and widespread (BoCC Green listed) species were also recorded breeding in the northern development area. Also as outlined above, a total of nine BoCC red-list species, 13 BoCC amber-list species and a further 16 common and widespread (BoCC Green listed) species were also recorded as breeding in the southern development area. The majority of species were only present in woodland areas in the site. The most populous species recorded in woodland were coal tit, chaffinch, robin, siskin, willow warbler and wren. The breeding bird assemblage is a very typical of common and widespread species in these habitat types in Scotland, and not considered sensitive to wind farm development (SNH, 2017).	Low
Common Crossbill	A Schedule 1 species. Despite their classification as a Schedule 1 species, this is due to potential confusions with the similar and far less numerous Scottish and Parrot crossbill species. Given that both Scottish and Parrot crossbill are not recorded in south-west Scotland, it is considered that the Schedule 1 protection afforded common crossbill is not relevant in this case. Recorded as a breeding species in plantation forestry within the northern development area.	Low

Ornithological Features Scoped Out of Assessment

6.7.1 Ornithological features of medium and high NCI are considered IOFs. Due to a range of factors, some of these IOFs can be scoped out of further consideration if they are not vulnerable to effects from the Proposed Development.

6.7.2 Following evaluation of the baseline data, including desk study and field survey data, and considering the standard mitigation measures, as described in **Section 6.8**, some potential effects on IOFs can be scoped out of the assessment, as described in **Table 6.11** below. This is based on professional judgement and experience from other relevant projects in the region.

6.7.3 The subsequent assessment of effects has been applied to IOFs considered to be of high or medium NCI (as per Table 6.2) that are known to be present within the site or surrounding area (as confirmed through survey results and consultations outlined above).

Table 6.11: Features Scoped in / out of the Assessment

IOF	Rationale for Scoping In/Out	Scoped In/Out
Muirkirk and North Lowther Uplands SPA	The SPA is designated for breeding golden plover, hen harrier, merlin, peregrine and short-eared owl and non-breeding hen harrier. As discussed above, golden plover, hen harrier, merlin and short-eared owl were not recorded as breeding during all surveys at the site. Short-eared owl were not recorded during any survey at the site and therefore breeding short-eared owl are scoped out of the assessment. A single golden plover flight was recorded on August 13th 2023 and is considered more likely to be birds relocating post breeding season rather than birds from a local breeding population. With no breeding activity or flight activity linked to breeding activity, breeding golden plover are scoped out of the assessment. No hen harrier and merlin flightlines were recorded during the breeding season in the northern development area. A single merlin flight on August 24th 2022 was the only record during the breeding season for either species in the southern development area. With no breeding records and no flight activity, breeding hen harrier and merlin are scoped out of the assessment. Peregrine were recorded as breeding during the surveys of the wider area and the breeding record was not considered to be part of the SPA population and over 5 km from the site. With only a single flight during the breeding season and a predicted collision of only 0.01 collisions per annum, breeding peregrine are scoped out of the assessment. Hen harrier were recorded occasionally during non-breeding season surveys, with a single record in the northern development area and occasional records to the north of the southern development area. No records of roosting hen harrier were recorded during winter walkover surveys. Therefore, with such low flight activity within the site, wintering hen harrier are scoped out of the assessment.	Scoped out: Muirkirk and North Lowther Uplands SPA – all features.

IOF	Rationale for Scoping In/Out	Scoped In/Out
Muirkirk Uplands SSSI	The SSSI is designated for breeding hen harrier and short-eared owl, and non-breeding hen harrier and breeding bird assemblage. For the same reasons as discussed above for the SPA, breeding short-eared owl and breeding and non-breeding hen harrier are scoped out of the assessment. Surveys identified multiple breeding records for curlew and snipe, as well as other moorland breeding passerines most notably skylark and meadow pipit.	Scoped in: Breeding bird assemblage. Scoped out: Breeding and non-breeding hen harrier and breeding short-eared owl.
Airds Moss RSPB reserve & SAC	Designated for its moorland habitats and the breeding bird assemblage. These bird species have been assessed as part of the statutory designations outlined above. Located over 2.1 km from the closest point of the southern development area and 7.5 km from the northern development area means the Airds Moss RSPB reserve is unlikely to be impacted by the Proposed Development.	Scoped out: Airds Moss RSPB reserve
Dungavel WF Habitat Management Plan Areas (DHMPA)	The DHMPA includes areas outlined for habitat improvement for black grouse and hen harrier. Some of the DHMPA proposed hen enhancement areas within the northern development area, and will overlap to some extent with the Proposed Development. The areas of habitat enhancement proposed for black grouse on Dungavel Hill will not be impacted by the Proposed Development and can be implemented as planned.	Scoped in: DHMPA hen harrier enhancement areas within northern development area Scoped out: DHMPA black grouse enhancement areas within northern development area
Golden plover (wider area population)	Golden plover is listed on Annex I of the Birds Directive and as discussed is a qualifying feature of the Muirkirk and North Lowther Uplands SPA as a breeding species. With just four flights associated with non-breeding golden plover totalling 13 individuals and a predicted annual collision risk of 0.04,non-breeding golden plover is scoped out of the assessment.	Scoped out: Golden plover (wider area population).
Lapwing	With multiple breeding records in the southern development area and regular flight activity in the same area, lapwing is scoped into the assessment.	Scoped in: Lapwing
Oystercatcher	With multiple breeding records in the southern development area and regular flight activity in the same area, oystercatcher is scoped into the assessment.	Scoped in: Oystercatcher

6.8 Standard Mitigation

6.8.1 As previously noted, following CIEEM (2018) guidance, the assessment process assumes the application of standard mitigation measures. This section of the assessment details the mitigation measures that have been applied to ameliorate identified impacts associated with the construction and operational phase of the Proposed Development. These measures have been developed to prevent, reduce or offset any likely significant effects of the Proposed Development on IOFs. This approach is in accordance with good practice guidance and UK, Scottish and Local Government environmental, planning and sustainability policies and legislation.

6.8.2 The principles and objectives for mitigation associated with the Proposed Development have been developed through an iterative process with the Applicant's design team and consultation with NatureScot, RSPB and other stakeholders.

6.8.3 Mitigation includes good practice methods and principles applied to the Proposed Development as a whole (standard measures) as well as site specific mitigation measures applied to individual locations (specific measures).

6.8.4 All ornithological mitigation will be incorporated into a Construction Environmental Management Plan (CEMP). An outline version of the CEMP is provided in **Technical Appendix 3.1**. This CEMP will also outline a timetable of actions and form part of the contract documents to ensure delivery of mitigation specified in this chapter. In addition, the CEMP will incorporate the provision of an Ecological Clerk of Works (ECoW) to oversee the implementation of committed mitigation.

6.8.5 In the event of consent being granted, the generic mitigation measures that apply to all ornithological features, and assumed to be implemented for the purposes of assessing potential impacts, are outlined below:

- Not more than 12 months prior to construction of the Proposed Development, the Applicant will engage a Suitably Qualified Ecologist (SQE) to undertake a series of pre-construction ornithological surveys to update the baseline information reported in this chapter. The aim of these surveys would be to provide up to date information in order to finalise the mitigation proposals. This would be in addition to completing a final check prior to construction for protected species (see Chapter 7 of this EIA Report)..
- Recommended disturbance buffers apply for protected bird species at their nest and/or lek sites, with recommended distances outlined by Goodship and Furness (2022) and the Forestry Commission (FCS, 2007). Any disturbance to Schedule 1 species is considered to be a criminal offence and therefore should any nests be identified in future pre-commencement surveys, no heavy construction works will take place within the recommended guidance distances for the entire time the breeding attempt is considered active.
- Due to the proximity of the site to the SPA, during the bird breeding season (March–August) any track upgrading work, wider construction activity or use of access tracks by construction traffic occurring within 750 m of the SPA must be undertaken in accordance with a Breeding Bird Protection Plan which will be submitted to and approved NatureScot and South Lanarkshire Council.
- Further to or incorporated into the update surveys above, protection of breeding bird nests from damage and/or destruction during the breeding season will need to be ensured. Wherever possible, all tree felling and vegetation clearance will occur outside the breeding season (*i.e*. clearance to be undertaken between September and March, inclusive, and wherever possible between October and February), to ensure that no active nests are damaged or destroyed by the proposed works. This would include any areas of shrub

clearance and vegetation removal for access tracks, compounds or turbine bases. Removing vegetation from working areas outside the breeding season would also reduce the attractiveness of those areas to breeding birds the following season, which means that birds are less likely to breed in those areas.

- Given the requirement for felling of plantation forestry as part of the works, a bird Species Protection Plan (SPP) will be implemented to prevent harm to breeding birds including species such as common crossbill as a result of these works.
- Unnecessary disturbance to habitats will be avoided, by minimising the extent of ground clearance and other construction practices as far as practicable.
- An ecological toolbox talk will be given to all construction personnel as part of site induction on the potential presence of ornithological species and any measures that need to be undertaken should such species be discovered during construction activities. The toolbox talk will also include the requirement to report and log any bird casualties at the Proposed Development during construction and operation of the site.

6.8.6 As part of the Proposed Development, it will be necessary to develop and implement a Site Restoration Plan (SRP) as part of the CEMP to ensure the regeneration of those areas of habitat that have been temporarily disturbed through construction. In order to facilitate restoration, disturbed ground will be restored as soon as practicably possible using materials removed during the construction of access tracks, excavation of cable trenches and turbine/solar/BESS/substation foundations. To achieve this, any excavated soil will need to be stored in such a manner that is suitable to facilitate retention of the seed bank. This will aid site restoration and help conserve the pre-construction floristic interests at the site. Further details are given in the Outline Peat Management Plan, **Technical Appendix 7.4**.

6.8.7 Additional, specific mitigation measures are discussed in **Section 6.12**.

6.9 Potential Impacts

6.9.1 The main elements of the Proposed Development which have the potential to impact on IOFs during construction and/or operation are:

- tree felling;
- track construction, including culverting of watercourses/drainage ditches, mobile plant traffic movements and potential for dust generation;
- temporary borrow pit operations, including potential for dust generation;
- turbine foundation creation, including excavation, pile-driving of anchors, *etc*.;
- crane pad and permanent hardstanding construction;
- cable-laying and grid connection infrastructure, including substations;
- installation of solar panels, BESS and associated infrastructure;
- temporary lay-down and site compound areas;
- temporary materials storage (soils and turves);
- site water management; and
- site restoration (track batters, compounds, *etc*.).

6.9.2 The above activities have the potential to cause the following construction impacts to the IOFs identified for the site:

- Direct loss of foraging habitat and/or breeding habitat;

- Indirect loss of foraging habitats and/or breeding habitat through displacement; and
- Disturbance (including noise, vibration, pollution) and displacement due to heavy machinery, noise and human activity associated with the construction works on the site. Disturbance of ground vegetation may affect a zone of approximately 5 m around all infrastructure.

6.9.3 The potential operational impacts have been identified as:

- direct habitat loss and indirect loss of foraging or breeding habitat due to displacement or avoidance;
- habitat change (modification) over time (N.B. operation phase drying of peaty or marshy substrates may affect up to approximately 10 m around workings);
- barrier effects created by the wind farm;
- aviation lighting;
- reflection / glare impacts due to solar panels;
- mortality resulting from collision with a turbine; and
- cumulative impacts of the Proposed Development in the context of other nearby wind farms (operational, consented and in planning).

6.10 Assessment of Construction Effects

6.10.1 Considering the information on the baseline conditions detailed in **Section 6.6** and the proximity of the site, and despite the limited breeding and flight activity of qualifying species, there is the potential for connectivity between the site and all Muirkirk and North Lowther SPA qualifying features. Given the potential for the activities associated with the Proposed Development's construction and operation to result in adverse effects on the qualifying interests of the European site and therefore the potential of a 'likely significant effects' conclusion in HRA terms. The Muirkirk and North Lowther Uplands SPA is therefore scoped into the HRA process dealt with below in **Section 6.15**.

Muirkirk Uplands SSSI: Breeding Bird Assemblage

6.10.2 **Impact**: Displacement of Muirkirk Uplands SSSI - Breeding Bird Assemblage from the site during construction, either by temporary disturbance or because of direct habitat loss.

6.10.3 **NCI / Conservation Status of the feature**: As per **Table 6.10** Muirkirk Uplands SSSI Breeding Assemblage are High NCI. The breeding bird assemblage has a status of favourable (See **Table 6.7**). Overall sensitivity is considered to be Medium-High.

6.10.4 **Magnitude of Impact**: The Muirkirk Uplands SSSI lies directly to the south and east of the northern development area, although over 200 m from the nearest infrastructure (a similar distance to that of the consented Hare Craig Wind Farm on the opposite side of the SSSI). It is considered unlikely that construction activities within the northern development area will create any significant effects on the SSSI Breeding Bird Assemblage. The majority of the work will be within areas predominantly covered in plantation forestry, these areas would be rarely used by SSSI breeding assemblage species such as curlew and snipe and only used on an occasional basis for breeding birds to commute from nesting grounds to forage elsewhere in the local area. A single curlew and a single snipe territory were recorded within 500 m of the northern development area boundary but as they are over 500 m from any infrastructure they are unlikely to be significantly impacted during construction. Passerine species such as skylark, stonechat and whinchat were recorded in open areas within the site and immediate surrounds and as such may be disturbed or displaced due to construction activities at the site..

6.10.5 The Muirkirk Uplands SSSI lies directly north of the southern development area, separated from works by a small unnamed road. Breeding bird surveys identified two curlew breeding territories within the southern development area, with a further three and one in 2022 and 2023 respectively in the 500 m survey buffer. A single snipe territory was recorded in the southern development area in 2022, and one in the 500 m buffer in 2023. Skylark and meadow pipit were frequently recorded within open grassland in the southern development area with other moorland breeding species, wheatear, whinchat and stonechat, infrequently recorded.

6.10.6 The SSSI citation does not provide any population figures for breeding species. Surveys undertaken at the site identified 19 curlew and 12 snipe territories in the SSSI in direct proximity to the site, in an area which covered 3,910 hectares. Given the SSSI is an area of 19,154 hectares an estimate figure of curlew would be 95 breeding pairs and snipe 60. Skylark and meadow pipit are BoCC Red and BoCC Amber listed species respectively but are still extremely common and widespread across moorland habitats in much of Scotland. Breeding bird surveys across the wider site (almost entirely in the Muirkirk Uplands SSSI) in 2022 recorded approximately 1,000 breeding territories for both species, with much of the habitat in the SSSI optimal for these species. The loss of two breeding pairs of curlew and one pair of snipe would comprise 2.1% and 1.67% of the NHZ19 populations, although in reality these breeding pairs if they were impacted during construction would be more likely to relocate to other areas in the immediate surrounds rather than be lost to the SSSI population given the abundance of suitable habitat nearby.

6.10.7 Given the potential for small numbers of the SSSI Breeding Bird Assemblage to be affected during construction, the overall impact is considered to be direct, short-term and low magnitude.

6.10.8 **Significance of Effect**: As outlined above, the magnitude of the impact on the SSSI population of Muirkirk Uplands SSSI Breeding Assemblage as a result of construction is deemed to be low, and short-term. The NCI is high. The effect is therefore considered to be **minor** adverse for Muirkirk Uplands SSSI Breeding Assemblage and **not significant** under the EIA Regulations.

Dungavel WF Habitat Management Plan Areas (DHMPA) - Hen Harrier

6.10.9 **Impact**: Displacement of breeding birds from the DHMPA during construction, either by disturbance or because of direct habitat loss.

6.10.10 **NCI / Conservation Status of the Receptor**: As per **Table 6.10** The DHMPA is Medium NCI. Hen harrier are BoCC Red list species and the SPA population is cited as unfavourable declining, and therefore are considered to be of unfavourable status. Overall sensitivity is considered to be medium-high.

6.10.11 **Magnitude of Impact**: The construction activities within the northern development area are in areas that may impact on some of the DHMPA within the site. However, as outlined earlier in this chapter it is important to note that only a relatively small proportion of the DHMPA within the northern development area has been implemented to date (approximately 28 ha out of a total of 208 ha proposed), therefore, this is more of a theoretical impact than an actual impact.

6.10.12 No breeding attempts of hen harrier were recorded during baseline surveys within the DHMPA, the site as a whole, or within the wider survey area. The desk study identified a total of two historic hen harrier breeding attempts in Dungavel Forest, one in 1991 and one in 2004.

6.10.13 Given there have been no breeding records for hen harrier in Dungavel Forest in the last 20 years, much of the DHMPA proposed within the site has not yet been implemented, and much more suitable habitat exists elsewhere, it is considered very unlikely that construction activities at the Proposed Development will impact on this species. For effects with regards to DHMPA habitats, it is noted that much of this proposed hen harrier enhancement habitat is yet to be created and that there will be only very limited incursion around the fringes of the one area that has been delivered so far. Therefore, any impact on DHMPA habitats is considered to be negligible (refer to **Chapter 7**).

6.10.14 The recommended (no) disturbance buffer required for heavy construction activities is 500-750 m for breeding locations of hen harrier (Goodship and Furness, 2022). The appointed

ECoW will identify active nesting locations prior to any works taking place. If any nest sites were to be identified, then appropriate mitigation measures (such as suitable exclusion zones/buffers outlined above) to protect nest sites would be implemented.

6.10.15 Given the very limited potential for the breeding population of hen harrier to be disturbed or displaced during construction, the overall impact on DHMPA (hen harrier) is considered to be direct, short-term and negligible magnitude.

6.10.16 **Significance of Effect**: As outlined above, the magnitude of the impact on the theoretical DHMPA (hen harrier) population as a result of construction is deemed to be negligible, and short-term. The NCI is medium. The theoretical effect is therefore considered to be **negligible** and **not significant** under the EIA Regulations.

Waders (golden plover-wider area population, lapwing, oystercatcher)

6.10.17 **Impact**: Displacement of breeding, foraging or roosting waders from the site during construction, either by disturbance or because of direct habitat loss.

6.10.18 **NCI / Conservation Status of the Receptor**: As per **Table 6.10** golden plover, lapwing and oystercatcher are Medium NCI. Lapwing, oystercatcher and golden plover are BoCC Red, Amber and Green list species respectively, and therefore lapwing and oystercatcher are considered to be of unfavourable status and golden plover are considered to be of favourable status. Overall sensitivity is considered to be medium.

6.10.19 **Magnitude of Impact**: The construction activities within the northern development area are unlikely to create any substantial impacts on breeding, foraging or roosting waders with the area predominantly covered in plantation forestry, as this area would only be used infrequently by commuting golden plover, lapwing and oystercatcher.

6.10.20 Breeding surveys identified four lapwing territories in the southern development area in 2021, one in 2022 and none in 2023. A total of two oystercatcher territories were recorded in the southern development area in 2022 and 2023 with two further territories recorded in both years in the 500 m survey buffer. Golden plover were not recorded as a breeding species. In addition to the breeding records a total of nine lapwing flights and 13 oystercatcher flights were recorded from VP3 with the flight activity associated with the breeding pairs. A total of three flights for golden plover were recorded over the northern development area and a single flight over the southern development area.

6.10.21 The recommended (no) disturbance buffer required for heavy construction activities is 50-100 m for breeding locations of oystercatcher and 200-500 m for breeding and non-breeding locations of golden plover (Goodship and Furness, 2022). Lapwing is not mentioned within the guidance but another plover species, ringed plover, has recommended distance of 100-200 m as has dunlin (Goodship and Furness, 2022) so a similar value is presumed appropriate for lapwing.

6.10.22 Given the presence of breeding lapwing and oystercatcher recorded within these disturbance distances during breeding surveys, impacts during construction are considered a possibility. Likely impacts on both these wader species during construction could include potential mortality as a result of construction activities, displacement from breeding habitat, temporary disturbance as a result of soil stripping and increased noise and vibration and habitat loss. Mortality may result if construction activities are undertaken during the bird breeding season where nests and chicks may be destroyed.

6.10.23 Potential disturbance during construction may result in the temporary displacement from the areas of land clearance and a slightly wider area adjacent to it. During the breeding season, in order to avoid the abandonment of nests or breeding territories as a result of disturbance, the standard mitigation measures outlined above will be undertaken, including the pre-construction checks. The appointed ECoW will identify active nesting locations prior to any works taking place. If nest sites are identified then appropriate mitigation measures (such as suitable exclusion zones/buffers outlined above) to protect nest sites will be implemented.

6.10.24 No figures for the NHZ19 population of lapwing or oystercatcher are provided, Forrester *et al* (2012) estimate breeding populations Scotland wide to be 84,500 to 116,500 pairs for oystercatcher and 71,500-105,000 pairs for lapwing. The wintering population of golden plover is considered to be 25,000-35,000 birds Forrester *et al* (2012).

6.10.25 Given there are only 1-4 breeding pairs of lapwing and between 2-4 breeding pairs of oystercatcher were recorded and with low levels of flight activity over the site, it is considered more likely that the breeding pairs would move away from the disturbance areas into nearby suitable habitat, rather than be lost to the local population, meaning any impacts on local populations will be minimal.

6.10.26 Given the potential for small numbers of the breeding populations of breeding lapwing and oystercatcher and wintering golden plover to be affected during construction, the overall impact on waders is considered to be direct, short-term and negligible magnitude (<1% of the regional population).

6.10.27 **Significance of Effect**: As outlined above, the magnitude of the impact on the NHZ19 populations of lapwing, oystercatcher and wintering golden plover as a result of construction is deemed to be negligible, and short-term. The NCI is medium. The effect is therefore considered to be **negligible** and **not significant** under the EIA Regulations.

6.11 Assessment of Operational Effects

6.11.1 Effects of direct land take on birds (*i.e*. decreased resource availability) are considered to be limited given the relatively small percentage of the site, in particular the northern development area, that will be occupied by the footprint of the development. Where a component of the Proposed Development is sited on, or close to, a specific type and area of habitat used by one or more bird species identified as IOFs (refer to **Section 6.7**), the potential effect on those IOFs has been assessed and is discussed in relation to each relevant species below.

6.11.2 The two main ways in which birds can be affected by operational wind farms are:

- through displacement due to ongoing disturbance caused by wind turbine structures (*i.e*. including barrier effect) and associated equipment (and by periodic servicing of them); and
- potential mortality through collision with moving blades or associated infrastructure.

6.11.3 The two main ways in which birds can be affected by operational solar farms and BESS are:

- through displacement due loss of habitat due to the solar panels, BESS and substations and ongoing disturbance caused and by periodic servicing of them; and
- displacement from the area due to potential impacts of glint and glare from solar panels.

Displacement Effect

6.11.4 The displacement of nesting and foraging birds from the site has the potential to extend beyond the construction phase, as described above, and to occur during the operational phase. It is recognised that disturbance may occur due to maintenance activities throughout the operational phase, although since these are likely to be of shorter duration and smaller extent than construction activities, effects will be lower than those predicted for construction effects (refer to previous section).

6.11.5 A range of studies have concluded that most bird species are not significantly affected by operational wind farms (*e.g.* Vauk, 1990; Percival, 2005; Devereux *et al*., 2008; Winkelmann, 1994; Langston and Pullan, 2003; Hotker *et al*., 2006). This is reflected, in part, by NatureScot guidance (SNH, 2017) on birds and wind farms which does not, for example, normally recommend surveys for breeding passerines. The NatureScot guidance, which is the UK standard, indicates that effort should focus on species and/or species groups that are thought to be susceptible to the effects of wind farms or highly protected species on which potential effects remain unclear.

6.11.6 The full effects of solar panels on birds are not yet fully understood, with detailed studies limited to date. A review of available literature undertaken in 2019 (BSG, 2019) details knowledge of mortality through collisions with solar arrays, although only in large concentrated solar arrays of the type unlikely to be found in the UK. There is some evidence of birds being attracted to sources of polarised light (Bernath *et al*, 2001) while Harrison *et al*. (2017) suggested birds that drink on the wing such as swallow could be at risk of collision with solar panels. Studies suggest the impacts of solar farms include habitat loss and displacement, with ground nesting birds such as skylark displaced in part due to loss of habitat and in part due to the loss of line of sight (Smith *et al*, 2016, Monteg *et al* 2016). Other studies are inconclusive with results showing bird densities reduced in some solar arrays and other studies showing the opposite with increased density with increased foraging opportunities for birds and shelter opportunities with solar arrays including biodiversity enhancements such as native meadow planting.

6.11.7 Due to having no or very low flight activity across the 24 months of survey at the northern development area (see **Table 6.8**), the general nature of their flight behaviour and the fact that they were not recorded breeding or within disturbance distance of the turbines, all species are not considered to be impacted in terms of displacement due to the operational wind farm component of the Proposed Development.

6.11.8 The displacement effect is therefore considered to be limited to the southern development area effects on SSSI Breeding Bird Assemblage and breeding waders.

Muirkirk Uplands SSSI: Breeding Bird Assemblage

6.11.9 **Impact**: Displacement of Muirkirk Uplands SSSI Breeding Bird Assemblage from the site and functionally linked areas of the SSSI during the lifetime of the solar farm either by disturbance, direct habitat loss or due to the reflective nature of the solar panels.

6.11.10 **NCI / Conservation Status of the receptor**: As per **Table 6.10** Muirkirk Uplands SSSI Breeding Assemblage is of High NCI. The breeding bird assemblage has a status of favourable (See **Table 6.7**). The overall sensitivity is considered to be medium-high.

6.11.11 **Magnitude of Impact**: The presence of solar panels within the southern development area will mean areas of grassland for breeding and foraging will be lost underneath the operational panels, while the reflective nature of the solar panels may lead to flying birds avoiding the area.

6.11.12 The Muirkirk Uplands SSSI lies directly north of the southern development area, and as discussed above the breeding bird surveys identified two curlew breeding territories within the site, with a further three in the 500 m survey buffer, plus a single snipe territory. A number of passerine species in particular skylark and meadow pipit were recorded within open grassland in the southern development area with wheatear, whinchat and stonechat also record infrequently.

6.11.13 Operation of the solar farm activities could lead to displacement from breeding habitat, due to habitat loss and / or the potential impact of reflective glare of the panels. This may lead to the loss of these pairs that are considered to be part of the SSSI breeding population, although it is considered more likely that, if they are impacted, that breeding pairs will simply relocate to other suitable breeding habitat, widely available in the local area.

6.11.14 As discussed above the loss of two breeding pairs of curlew and one pair of snipe would comprise 2.15% and 1.67% respectively of the SSSI populations. Given the uncertainty of the impacts of operational solar farms on birds means there is the potential for small numbers of the SSSI Breeding Bird Assemblage to be affected during the operational phase of the solar farm, the overall impact is therefore considered to be direct, long-term and low magnitude.

6.11.15 **Significance of Effect**: As outlined above, the magnitude of the impact on the SSSI population of Muirkirk Uplands SSSI Breeding Assemblage as a result of operation is deemed to be low, and long-term. The NCI is high and the status is favourable. The effect is therefore considered to be **minor** for Muirkirk Uplands SSSI Breeding Assemblage and **not significant** under the EIA Regulations.

Dungavel Wind Farm Habitat Management Plan Areas (DHMPA) - Hen Harrier

6.11.16 **Impact**: Displacement of breeding birds from the DHMPA through the operational wind farm either due to disturbance or habitat loss.

6.11.17 **NCI / Conservation Status of the Receptor**: As per **Table 6.10** DHMPA is Medium NCI. Hen harrier are BoCC Red list species and the SPA population is unfavourable declining having seen significant declines in recent years, and therefore are considered to be of unfavourable status. The overall sensitivity is therefore considered to be medium-high.

6.11.18 **Magnitude of Impact:** Parts of the DHMPA lie within the northern development area, and the DHMPA details areas of Dungavel Forest which are proposed as habitat restoration and management in order to make the habitats suitable for breeding hen harrier. However, as outlined earlier in this chapter it is important to note that only a relatively small proportion of the DHMPA within the northern development area has been implemented (approx. 28 ha out of a total of 208 ha proposed), therefore, this is more of a theoretical impact than an actual impact.

6.11.19 In the 10 years since Dungavel Wind Farm was constructed the SPA population of hen harrier has reduced to zero pairs across the full area of the SPA (26,832 ha). Baseline surveys at the Proposed Development site did not identify any breeding attempts for hen harrier (2021-2023), and no flight lines were recorded during the breeding season. Given the amount of suitable habitat within the adjoining SPA, and that there have been no hen harrier breeding records in the SPA for over 10 years now, it is considered that without recolonisation of the SPA by hen harrier, it is unlikely the DHMPA, even if implemented in full, would deliver any meaningful results for hen harrier recovery.

6.11.20 Therefore, given the lack of breeding records in the SPA in the preceding ten years, given much of the DHMPA proposed within the Proposed Development site has not yet been implemented, and given the wider socio-economic and renewable energy benefits that stand to be delivered from the Proposed Development, it is considered more beneficial to qualifying species of the SPA to concentrate habitat management efforts and funding on encouraging breeding hen harrier back into the wider SPA, where much more suitable habitat exists that could be improved as part of a privately funded long-term management scheme (refer to **Technical Appendix 7.5**). As set out in the Mitigation and Enhancement section (**Section 6.12**), it is therefore proposed to substitute the (largely yet to be implemented) hen harrier enhancement areas (208 ha) proposed within Dungavel Forest as part of the DHMPA with a long-term pilot project on a larger area (592 ha) of historically preferred breeding habitat within the neighbouring Muirkirk and North Lowther Uplands SPA (and SSSI) where the SPA qualifying species were recorded as breeding species in multiple years (refer to Figure 1 of **Technical Appendix 7.5**, which is found in the EIA Report Confidential Annex).

6.11.21 Notwithstanding the above, it is incumbent upon this assessment to consider a scenario where the DHMPA were delivered in full, and the Proposed Development becomes operational. In this scenario, it would remain possible for any hen harrier present in the area to access the DHMPA within the northern development area, as hen harrier generally fly low to the ground and in this part of the Proposed Development the turbines are widely spaced at over 750 m apart. Pearce-Higgins *et al.* (2009) do however suggest that hen harrier may be displaced from habitats close to operational turbines and there is the possibility that there could be an increased collision risk to hen harrier in attempting to access the DHMPA if implemented. Given this possibility it is realistic to suggest that, should the SPA be recolonised by breeding hen harrier in future years, operational turbines could lead to the displacement of hen harrier from the DHMPA if it was fully delivered at some point in the future.

6.11.22 Given the possibility that the operational turbines have the potential to displace any future breeding hen harriers from the DHMPA within the northern development area, the overall impact on the theoretical DHMPA (hen harrier) population during operation is considered to be direct, long-term and **medium** adverse magnitude.

6.11.23 **Significance of Effect**: As outlined above, the magnitude of the impact on the theoretical DHMPA (hen harrier) population as a result of construction is deemed to be medium, and long-

term. The NCI is medium. The theoretical effect in the absence of additional mitigation is therefore considered to be **moderate** and **significant** under the EIA Regulations.

Waders (breeding lapwing and oystercatcher)

6.11.24 **Impact**: Displacement of breeding waders from the site during the lifetime of the solar farm component of the Proposed Development either by disturbance, direct habitat loss or due to the reflective nature of the solar panels.

6.11.25 **NCI / Conservation Status of the receptor**: As per **Table 6.10** lapwing and oystercatcher are Medium NCI. Lapwing, oystercatcher are BoCC Red and Amber list species, respectively, and therefore lapwing and oystercatcher are considered to be unfavourable status.

6.11.26 **Magnitude of Impact**: The presence of solar panels within the southern development area will mean areas of grassland for breeding and foraging will be lost underneath the operational panels, while the reflective nature of the solar panels may lead to flying waders avoiding the area.

6.11.27 As discussed above breeding surveys identified four lapwing territories in the southern development site in 2021, one in 2022 and none in 2023 and two oystercatcher territories in 2022 and 2023 as well as nine lapwing and 13 oystercatcher flights associated with the breeding pairs.

6.11.28 The recommended (no) disturbance buffer required for heavy construction activities is 50-100 m for breeding locations of oystercatcher (Goodship and Furness, 2022). Lapwing is not mentioned within the guidance but another plover species, ringed plover, has recommended distance of 100-200 m as has dunlin (Goodship and Furness, 2022) so a similar value is presumed for lapwing.

6.11.29 Given the presence of breeding lapwing and oystercatcher recorded within these disturbance distances during breeding surveys, the solar farm operation may lead to displacement from breeding habitat, due to habitat loss and / or the potential impact of reflective glare of the panels. This may lead to the loss of the breeding population within the southern development area, although it is considered more likely that if they are impacted that breeding pairs will simply relocate to other breeding locations in the local area. Oystercatcher in particular are often found breeding within areas of man-made construction, nesting on roundabouts and on industrial building rooves and therefore may not be impacted at all by a solar farm.

6.11.30 As mentioned above no figures for the NH19 population of lapwing or oystercatcher are provided, Forrester *et al* (2012) estimate breeding populations Scotland wide to be 84,500 to 116,500 pairs for oystercatcher and 71,500-105,000 pairs for lapwing. Given only 1-4 breeding pairs of lapwing, and between 2-4 breeding pairs of oystercatcher were recorded, the overall impact on waders is considered to be direct, long-term and negligible magnitude (<1% of the regional population).

6.11.31 **Significance of Effect**: As outlined above, the magnitude of the impact on the NHZ19 populations of waders as a result of construction is deemed to be negligible, and long-term. The NCI is medium and the status unfavourable. The effect is therefore considered to be **negligible** and **not significant** under the EIA Regulations.

Barrier Effect

6.11.32 In addition to the impacts of the displacement of birds from turbines as discussed in the sections above, there is also the possibility that a wind farm may act as a barrier to bird movement. The barrier effect is more likely to increase with the size of the wind farm development and will depend on the location of a given development and the species present. Barrier effects are more likely to be significant when the turbines are located in an important flight path, for example between a breeding site and foraging or roosting location or wildfowl returning from foraging grounds to roost.

6.11.33 There is little evidence to support the opinion that barrier effects have been identified and have significant effects on populations (Drewitt and Langston 2006). This was also the

conclusion from modelling of energy costs to those bird species most likely to be sensitive to barrier effects (large and long-lived breeding birds such as seabirds) by Masden *et al*. (2010). Humphreys *et al*. (2015) concluded that the extent to which barrier and displacement effects have been differentiated between in the field is however highly debatable as both are manifested as a reduction of birds within the wind farm (Cook *et al*. 2014).

6.11.34 No species present at the site were recorded as having any distinct flight patterns, and whilst flight behaviour may be modified by the presence of wind turbines it is likely the same flights will simply be modified into other open areas in close proximity rather than being stopped due to the turbines. This has been assessed in the section above *i.e*. displacement from the turbine site, and therefore barrier effects are not specifically considered any further as a distinct impact.

Collision Effect

6.11.35 To date, onshore wind farms in the UK have generally not been associated with high collision rates, which is likely to be at least partly due to the fact that turbines are usually sited in areas with relatively low levels of bird activity (Percival 2005b, Madders and Whitfield 2006). Nonetheless, even low levels of additional mortality resulting from collision with turbines may result in significant effects on long-lived bird species with low productivity and slow maturation rates, especially when rarer species of conservation concern are affected (Drewitt and Langston 2006).

6.11.36 The frequency and likelihood of a collision occurring depends on a number of factors. These include the size, manoeuvrability, habitat use and flight behaviour of a particular bird species, the nature of the surrounding environment, weather conditions, and the structure and layout of the turbines (including their location) with respect to important habitats. Collision risk is likely to be higher for birds that spend relatively long periods in the air at collision height, such as hunting raptors and birds flying between feeding and roosting grounds (*e.g*. geese, swans or gulls). Collision risk is also higher in areas where large concentrations of birds are present (such as on major migration routes), in poor flying conditions such as strong winds, and when visibility is reduced (*e.g*. during dark nights and foggy conditions). Birds may also be more susceptible if the wind farm is located within an area of high prey density.

6.11.37 For the purposes of this section of the ornithology chapter, all CRM and analyses were completed following best practice guidelines and using recommended species-specific biometrics and avoidance rates (Band *et al.,* 2007; SNH 2000, 2010, 2017, 2018a; NatureScot, 2024). Collision risk analysis was informed by the data obtained during the flight activity surveys and corresponding flight lines (**Technical Appendix 6.1** Figures 1 to 3; **Confidential Annex 6.1** Figures 1 and 2); full details of the collision modelling calculations are provided in **Technical Appendix 6.2**.

6.11.38 Also as outlined in **Section 6.6**, CRM was undertaken for several species for which predicted collision rates were very low, with no potential for resultant significant effects, with the highest figure being golden plover (annual figure 0.04) and as such none are considered to warrant further consideration in the assessment.

Aviation lighting (all species)

All species

6.11.39 **Impact**: The presence of aviation lighting could lead to collision of birds with turbines; displacement of birds from the site; disruption and disorientation of birds on migration all of which could lead to increases in energy uses, injury or even mortality due to collisions with the turbines.

6.11.40 **NCI / Conservation Status of the receptor**: various as above.

6.11.41 **Magnitude of Impact**: The Proposed Development comprises 18 turbines, all of which are over 150 m in height. Given the height of the turbines there will be a need for visible aviation lighting, which stems from international and national standards that govern civil aviation. In

the UK the Civil Aviation Authority (CAA) interprets these international standards and, unless otherwise agreed, requires obstacles including wind turbines at, or above, 150 m in height to display visible aviation lighting to meet air safety requirements (NatureScot, 2024b).

6.11.42 The impacts of aviation lighting are not fully understood however, a recent Information Note by NatureScot (2024b) states that other than nocturnal migrating passerines the principal susceptible species are likely to be nocturnal seabirds. Therefore, the risk to the IOFs in this case is considered to be low.

6.11.43 The qualifying species of the SPA and SSSI such as hen harrier, merlin are peregrine are not known to fly much outside daylight hours, and whilst short-eared owl is nocturnal they generally fly at low levels while foraging and were not recorded during any surveys at the site. Golden plover are known to move to feeding grounds in the night, however there are no known collisions of golden plover due to turbines in the UK (Durr, 2023). Given the low levels of flight activity at the site of all IOFs, the overall impact of aviation lighting on all species is considered to be direct, long-term and negligible.

6.11.44 **Significance of Effect**: As outlined above, the magnitude of the impact on all species as a result of aviation lighting is deemed to be negligible, and long-term. The NCI is medium to high. The effect is therefore considered to be **negligible** and **not significant** under the EIA Regulations.

6.12 Mitigation and Enhancement Measures

6.12.1 Additional, specific mitigation (beyond the standard mitigation set out in **Section 6.8**) will be implemented to reduce or avoid potential adverse effects. Mitigation includes measures to be incorporated into the operational phase of the ornithological monitoring program and outlined below. Enhancement measures are also proposed, to deliver improvements to habitats important for bird species, as set out below.

6.12.2 For full details of the Habitat Management and Enhancement Plan, see **Chapter 7** and **Technical Appendix 7.5**. In respect of the DHMPA for hen harrier, given the lack of breeding records in the SPA in the preceding ten years and given relatively little of the DHMPA within the northern development area has yet been implemented, it is considered a better long-term approach is to concentrate efforts and funding on encouraging breeding hen harrier back into the wider SPA where better habitat exists. It is therefore proposed to substitute some (largely yet to be implemented) hen harrier enhancement areas proposed within Dungavel Forest as part of the DHMPA with a long-term pilot project on a much larger area (592 ha) of more suitable habitat within the neighbouring Muirkirk and North Lowther Uplands SPA (and SSSI) where hen harrier and other SPA qualifying species used to breed (refer to **Figure 1** in **Technical Appendix 7.5** (which is in the EIA Report Confidential Annex)).

Hen Harrier Enhancement

6.12.3 Mitigation for the loss of proposed DHMPA hen harrier enhancement areas will be achieved by providing a much larger alternative solution within the Muirkirk and North Lowther Uplands SPA (and SSSI) as noted above.

6.12.4 A long-term project will be delivered across an area of c.592 ha in the Muirkirk and North Lowther Uplands SPA (and SSSI) to improve habitat suitability and foraging conditions for hen harriers (and other SPA qualifying species merlin, short-eared owl and golden plover), with the target of reversing the decline in numbers within this part of the SPA and returning SPA qualifying species to areas of the SPA they used widely historically for breeding over 10 years ago. This will be in substitution for 101.1 ha of proposed hen harrier enhancement areas within Dungavel Forest and 107.5 ha of potential additional hen harrier enhancement areas within Dungavel Forest. In this regard, it is important to note that much of the DHMPA areas within the Proposed Development site are yet to be implemented, hence this proposal constitutes more of a theoretical substitution than an actual physical substitution. Full details on the HMEP proposal for the Proposed Development are provided in **Technical Appendix 7.5**.

Wader Management

6.12.5 In conjunction with the hen harrier enhancement project outlined above, and with regard to the previous NatureScot wader schemes implemented within Netherwood Farm's landholding, directly adjacent to the southern development area, the HMEP Manager will oversee suitable management of c. 136 ha of land to the west of the solar development area, and c. 11.5 ha within the solar development area, for the benefit of skylark and wader species. Management methods will include:

- grazing management to improve sward structure and species diversity;
- alterations to land management regimes including restricted cutting across the wader management areas;
- a restriction on the use of pesticides to improve invertebrate assemblages; and
- creation of wader scrapes in appropriate locations in proximity to the Greenock Water which would flood in spring and provide foraging for wader species in late spring and early summer.

6.12.6 Further details on the wader management proposals are outlined in **Technical Appendix 7.5**.

Post-Construction Monitoring

6.12.7 A full post construction monitoring program will be implemented to study the impacts of the wind farm on ornithology and most notably the impacts on the Muirkirk and North Lowther Uplands SPA qualifying species and breeding wader populations within the mitigation/enhancement areas.

6.12.8 The monitoring program will run in conjunction with the ecology monitoring as part of the HMEP, see **Chapter 7** and **Technical Appendix 7.5** for details.

6.12.9 In years 1-5, 10, 15 and 20 post construction (as per the guidance, SNH, 2009) a full breeding bird survey will be completed at the site and areas of proposed habitat management. The breeding bird survey will include a breeding raptor and waders survey in each of the years outlined. The program will be updated and managed under a continuous review and any changes agreed with NatureScot and RSPB as part of the HMEP monitoring proposals (see **Technical Appendix 7.5**).

6.12.10 The breeding wader and Schedule 1 species surveys will be undertaken of the (wader and hen harrier) habitat management and enhancement areas and 500 m buffer (refer to **Technical Appendix 7.5**) consisting of four visits between April and July.

6.13 Residual Effects

6.13.1 In the absence of mitigation, all the predicted effects during construction and operation were predicted to be minor or negligible, with the exception of potential effects on the theoretical DHMPA (hen harrier) population as a result of operation, which was assessed as moderate in the absence of additional mitigation.

6.13.2 With the implementation of the mitigation and enhancement measures as detailed above, the residual effects remain the same, except for the following changes:

- During operation, residual effects on SSSI breeding bird assemblage are modified from minor adverse to **minor beneficial**, and breeding waders from negligible to **minor beneficial** as a result of the long-term commitment to habitat management and enhancement for these species as set out in **Technical Appendix 7.5**.
- The substitution and increase in the area of habitat management for hen harrier (but also benefitting other ground nesting species) in more optimal habitat, as outlined in **Technical Appendix 7.5**, will improve foraging conditions and nesting potential for hen harrier (and other SPA species) as part of a fully funded long-term management plan which will modify

the impacts on the theoretical DHMPA breeding population of hen harrier from moderate adverse effects to **minor - moderate beneficial**.

6.13.3 See **Table 6.12** for details.

6.14 Cumulative Assessment

6.14.1 The assessment of ornithological effects associated with the Proposed Development alone predicted no significant residual effects for the identified IOFs. This is due to the low level of breeding records within the site and the very low activity levels at collision height of IOFs recorded during baseline surveys, as well as the commitment to standard and additional mitigation and enhancement measures. Consequently, no breeding activity is likely to be significantly affected for any IOF, and collision rates are likely to be negligible within a population context, both when considering all wind farm projects within the local area, and at a wider NHZ 19 level.

6.14.2 As noted in **Chapter 4**, there are no proposed or consented large-scale solar or BESS developments in close enough proximity to the Proposed Development site to warrant consideration of potential cumulative effects.

6.14.3 Given that the residual effects of the Proposed Development on all IOFs would contribute very little to the overall cumulative effect for each potential impact at an NHZ 19 level (in fact a number of IOFs would experience beneficial effects), an NHZ-level cumulative assessment is therefore not considered necessary.

6.15 Habitats Regulations Appraisal

6.15.1 Given the proximity of the Proposed Development to the Muirkirk and North Lowther Uplands SPA (and SSSI) (refer to **Table 6.6**), there is a potential for the activities associated with the Proposed Development's construction and operation to result in adverse effects on the qualifying interests of the European site. Consequently, a HRA is considered to be necessary to identify the nature and extent of any adverse effects and whether these are likely to affect the integrity of the designated site.

6.15.2 The HRA must formally be undertaken by the Energy Consents Unit as competent authority for the consideration of the Proposed Development application. This section provides information to inform the HRA (*i.e*. is a 'Shadow HRA') to enable the competent authority to undertake this process.

Legislative Background

6.15.3 Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora ('The Habitats Directive'), provides legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species through the establishment and conservation of an EU-wide network of sites. This network is known as Natura 2000 and is a European ecological network of special areas of importance for nature conservation, composed of sites hosting rare and vulnerable habitats and species. This network is designed to enable the natural habitat types and the species' habitats concerned to be maintained or, where appropriate, restored at a favourable conservation status in their natural range.

6.15.4 The UK has designated a number of sites of nature conservation importance which form part of a network of Natura 2000 Sites. As mentioned above, Natura 2000 Sites comprise SACs designated under the EC Habitats Directive and SPAs designated under the EC Wild Birds Directive. In addition, as clarified by Policy 4 of National Planning Framework 4 (Scottish Government, 2023), candidate SACs and proposed SPAs (*i.e*. sites which have been approved by Scottish Ministers for formal consultation but which have not yet been designated) are treated as if they had been fully designated, and wetlands of international importance designated under the Ramsar Convention (Ramsar site wetlands) are also treated as designated Natura 2000 Sites and/or SSSIs and are therefore also considered in HRAs. HRA considerations of avian receptors are presented in this section.

6.15.5 The procedures that must be followed when considering developments affecting Natura 2000 Sites are set out in Article 6 of the Habitats Directive. In Scotland, this process is implemented through the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) ('The Habitats Regulations').

6.15.6 Habitats Directive Article 6(3) set out the decision-making tests for plans and projects likely to have a significant effect on or to adversely affect the integrity of European sites (Annex 1.1). Article 6(3) establishes the requirement for Appropriate Assessment (AA):

> "*Any plan or project not directly connected with or necessary to the management of the [Natura 2000] site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subjected to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public*."

6.15.7 For reasons of clarity, it is confirmed that the Proposed Development is not related to or considered necessary for the management of the SPA designations.

6.15.8 Both EU and national guidance exists in relation to Member States fulfilling their requirements under the EU Habitats Directive, with particular reference to Article 6(3) and 6(4) of that Directive. The methodology followed in this report to inform the Article 6 assessments has had regard to the following guidance and legislation:

- Guidance:
  - SNH (2018b). Natura sites and the Habitats Regulations: How to consider proposals affecting SACs and SPAs in Scotland. The essential quick guide.
- Legislation:
  - Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (also known as the 'Habitats Directive').
  - Council Directive 2009/147/EC on the conservation of wild birds, codified version, (also known as the 'Birds Directive').
- The European Communities (Birds and Natural Habitats) Regulations 2011 to 2015.

Overview of Appropriate Assessment Stages

6.15.9 An HRA is a process to determine Likely Significant Effect (LSE) through Stage 1 screening and (where such likely effects are identified) assess whether there are adverse impacts on the integrity of a Natura Site by means of an Appropriate Assessment (AA) (Stage 2).

6.15.10 The threshold for an LSE is treated in the screening exercise as being above a trivial or 'de minimis' level. A de minimis effect is a level of risk that is too small to be concerned with when considering ecological requirements of an Annex I habitat or a population of Annex I (bird) or Annex II (non-avian) species present on a European site necessary to ensure their favourable conservation status. If low level effects on habitats or individuals of species are judged to be in this order of magnitude, and that judgment has been made in the absence of reasonable scientific doubt, then those effects are not considered to be significant.

6.15.11 Based on the outcome of the AA, the Competent Authority shall agree to a plan or project only after having ascertained that it will not adversely affect the integrity of the Natura 2000 site concerned.

6.15.12 The European Commission (2018) states that the 'integrity of the site' can be usefully defined as the coherent sum of the site's ecological structure, function and ecological processes, across

its whole area, which enables it to sustain the habitats, complex of habitats and/or populations of species for which the site is designated. They go on to state the following:

> *"The integrity of the site involves its constitutive characteristics and ecological functions. The decision as to whether it is adversely affected should focus on and be limited to the habitats and species for which the site has been designated and the site's conservation objectives."*

6.15.13 When considering the 'integrity of the site', it is therefore important to consider a range of factors, including the possibility of effects materialising in the short, medium and long-term.

6.15.14 The judgement (May 2018) of Case C-323/17 ('People Over Wind') affirms that ecological mitigation measures cannot be considered during Stage 1, and the European Commission (2018) therefore now considers that mitigation measures must be directly linked to the likely impacts that have been identified in Stage 2; they can therefore only be defined once these impacts have been described and assessed by the competent authority through an Appropriate Assessment.

6.15.15 Mitigation measures, which aim to avoid or reduce impacts or prevent them from happening in the first place, must not be confused with compensatory measures, which are intended to compensate for any damage that may be caused by the project. Compensatory measures can only be considered under Article 6(4) if the plan or project has been accepted as necessary for Imperative Reasons of Overriding Public Interest (IROPI) and where no alternatives exist.

6.15.16 Where a competent authority concludes through an AA that there will be an adverse effect on the integrity of a Natura 2000 Site, the Competent Authority may only agree to a plan or project if:

- it is evidenced that there are no alternative solutions (Stage 3); and
- there are IROPI for the advancement of the project (Stage 4).

Shadow HRA

Description

6.15.17 Muirkirk and North Lowther Uplands SPA comprises three adjacent upland areas (situated to the north and south of the town of Muirkirk, and the northern Lowther Hills), together with Airds Moss, a low-lying blanket bog situated between the two upland areas of north and south Muirkirk. The predominant habitats include semi-natural areas of blanket bog, acid grassland and heath.

6.15.18 The following Annex I species are qualifying features (See **Table 6.6** above for further details):-

- Breeding species:
  - Golden Plover;
  - Hen harrier;
  - Merlin;
  - Peregrine; and
  - Short-eared owl.
- Non-breeding:
  - Hen harrier.

6.15.19 As described in **Table 6.6**, breeding golden plover, breeding and non-breeding hen harrier are assessed as being 'unfavourable declining', breeding merlin and breeding peregrine as 'unfavourable no change' and breeding short-eared owl 'favourable maintained'.

6.15.20 In order to conduct the AA under Step 3 of the HRA process, it is necessary to ascertain whether the Proposed Development would not adversely affect the integrity of a Natura site ('Integrity Test'). NatureScot advises that "There are no concrete rules about what constitutes 'no adverse effect on site integrity'. Each case should be judged on its own merits".

6.15.21 To establish the effect of the Proposed Development on the integrity of an SPA, it is necessary to consider the relevant Conservation Objectives which may be affected:

1: To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and

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

- Population of the species as a viable component of the site;
- Distribution of the species within site;
- Distribution and extent of habitats supporting the species;
- Structure, function and supporting processes of habitats supporting the species; and
- No significant disturbance of the species.

Information to Inform Appropriate Assessment

6.15.22 All of the works undertaken as part of the Proposed Development would be outside of the SPA (with the exception of the underground cabling works within the existing B743 public road – see **Chapter 7**) and so no direct habitat loss to the SPA would occur as per objective 1 of the Conservation Objectives of the SPA. The assessments within **Chapter 7** (Ecology) and **Chapter 8** (Geology, Peat, Hydrology and Hydrogeology) confirm no indirect habitat modifications or changes to supporting function (*e.g*. changes in hydrology) to the SPA due to the results of construction processes are predicted (refer to **Chapter 7** and **Chapter 8** for further details).

6.15.23 The main impacts of the construction phase (and to a lesser extent the decommissioning phase) are disturbance and displacement of breeding and / or wintering birds' due noise and disturbance created by construction traffic and construction work. The main impacts during the operational phase are the displacement of birds from the site due to operational turbines and solar panels, and/ or habitat loss due to the presence of infrastructure including turbines, roads, BESS, substations and solar panels. These impacts are discussed in parallel below and may impact on conservation objective 1 and 2 (e).

6.15.24 All of the five qualifying features were recorded either during the desk study or during field surveys and are therefore screened into the assessment.

Hen harrier (breeding and non-breeding)

6.15.25 Hen harrier were not recorded as a breeding species during any of the breeding surveys at the site between 2021 and 2023. The raptor desk study details that the species was at one time widespread breeding in the SPA but the final record was noted in 2015, the last record within 5 km of the site was in 2011. There are two historic records of hen harrier breeding attempts within the northern development area but not since 2004 A single hen harrier flight was recorded in northern development area during the non-breeding season (08 January 2023) although the flight was not considered to be 'at-risk' therefore no collision risk was predicted for hen harrier (See **Confidential Annex 6.1** Figure 1). Hen harrier were also occasionally noted during non-breeding season flight activity surveys at the southern development area but the flights were over 1km from the site (See **Confidential Annex 6.1** Figure 1.)

6.15.26 The desk study shows that there are two historic breeding records within the northern development area (from 1991 and 2004). There are two further historic records within 750 m of proposed site infrastructure in the northern development area (in the same location in 2003 and 2005) and there are no historic records within 1 km of the southern development area. There have been no confirmed breeding records in this area of the SPA since 2015. (See **Confidential Annex 6.1** Figure 4.)

6.15.27 Given the lack of breeding records for this species (none in the wider SPA area in the past 10 years) and the lack of records within disturbance distance (500-750 m, Goodship and Furness, 2022) with no records since 2005, it is considered that construction activities at the site will not create any impacts on the breeding population of hen harrier.

6.15.28 The turbines within the northern development site are planned to be 'keyholed' within the forestry meaning the dominant habitat in this area will remain plantation forestry. Only a single flight for hen harrier was recorded within the forestry area in two full years of survey and the flight was recorded in January. With no predicted collision risk and very low flight activity over the site it is considered that collision risk and displacement and disturbance due to the operation of the wind farm within the northern development area and solar farm in the southern development area will have no impacts on the breeding or wintering population of hen harrier.

6.15.29 As such it is considered that there will be **no adverse effect on integrity** of the Muirkirk and North Lowther Uplands SPA's breeding and non-breeding hen harrier.

Merlin (breeding)

6.15.30 Merlin were not recorded as a breeding species during any of the breeding surveys at the site between 2021 and 2023 and no breeding season flights were recorded at the site. Occasional non-breeding season flight were noted in proximity to the southern development area (See **Confidential Annex 6.1** Figure 2.)

6.15.31 The desk study shows that there are no historic nest sites within the northern development area and no confirmed records since 2015, with the nearest historic records over 600 m from the nearest infrastructure. There are no historic records within 2 km of the southern development area. (See **Confidential Annex 6.1** Figure 4.)

6.15.32 Within no breeding records within the site and historic breeding records over the recommended disturbance distance for merlin (300-500 m, Goodship and Furness, 2022) as well as no records of flight activity in the breeding season means it is considered there will be no impacts on the breeding population of merlin during construction and operation of the Proposed Development.

6.15.33 As such it is considered that there will be **no adverse effect on integrity** of the Muirkirk and North Lowther Uplands SPA's breeding merlin.

Peregrine (breeding)

6.15.34 A single breeding territory was recorded in each 2021-2023 for peregrine, the breeding site was over 2 km from the SPA and over 5 km from the site. Two peregrine flights were recorded over the northern development area and with both the flights in part considered 'at-risk' an annual collision risk of 0.01 was predicted for peregrine. Peregrine were also recorded on seven occasions during flight activity surveys in the southern development area although only one of the flights traversed the site.

6.15.35 The desk study shows that there are historic nest sites in the wider area but there are no historic sites within 2 km of the site. (See **Confidential Annex 6.1** Figure 4.)

6.15.36 Given the low flight activity and annual collision risk of 0.01 birds per annum, plus the fact the only record nest in the area is over 5 km from the site and not within the SPA it is considered there will be no impacts on the breeding population of peregrine during construction and operation of the Proposed Development.

6.15.37 As such it is considered that there will be **no adverse effect on integrity** of the Muirkirk and North Lowther Uplands SPA's breeding peregrine.

Short-eared owl (breeding)

6.15.38 Short-eared owl were not recorded during any surveys at the site. The desk study shows historic nest sites between 2009-2011, none are within 2 km of the northern development area or southern development area. See **Confidential Annex 6.1** Figure 4. Post construction

monitoring for Dungavel Wind Farm identified a breeding record for short-eared owl in 2017 (but not in 2018), the breeding location was over 1 km from the site (RPS, 2017).

6.15.39 With no records of flight activity or breeding within the three years of field survey, and desk study breeding records being over 2 km from the site it is considered there will be no impacts on the breeding population of short-eared owl during construction and operation of the Proposed Development.

6.15.40 As such it is considered that there will be **no adverse effect on integrity** of the Muirkirk and North Lowther Uplands SPA's breeding short-eared owl.

Golden plover (breeding)

6.15.41 No evidence of breeding was recorded for golden plover at the site, with groups of birds noted in the site and wider area during non-breeding season flight activity surveys only.

6.15.42 It is therefore considered there will be no impacts on the breeding population of golden plover during construction and operation of the Proposed Development.

6.15.43 As such it is considered that there will be **no adverse effect on integrity** of the Muirkirk and North Lowther Uplands SPA's breeding golden plover.

In-combination effects

6.15.44 As outlined above, the assessment of the ornithological effects on the Muirkirk and North Lowther Uplands SPA predicts there will be no adverse effect on site integrity due to the Proposed Development alone. Surveys at the site and a historic desk study identified no breeding records in the site or in the SPA within disturbance distance of the site, for any species in the last 10 years and flight activity including collision risk for all species was either none or negligible. The site holds habitats being either plantation forestry or improved grassland fields which are sub-optimal for breeding or foraging for all qualifying species. It is the considered that the impacts associated with the Proposed Development on qualifying features of the SPA will not contribute to the in-combination effects of the SPA and therefore no in-combination assessment is deemed necessary.

Mitigation

6.15.45 As stated above no adverse effect on integrity of the SPA is predicted, however, in order to ensure the minimal likelihood (and as shown in **Sections 6.8** and **6.12**) the following are included as part of the mitigation and enhancement measures for the Proposed Development:-

- Breeding Bird Protection Plan during construction which will be submitted to and approved NatureScot and South Lanarkshire/East Ayrshire Councils; and
- a detailed HMEP throughout the operational period, including specific management areas for breeding hen harrier, short-eared owl and merlin and breeding waders alongside a detailed monitoring plan (refer to **Technical Appendix 7.5**).

HRA Summary

6.15.46 It is therefore concluded, from the evidence presented above, that the construction and operation of the Proposed Development would not result in an adverse effect on integrity of the Muirkirk and North Lowther Uplands SPA.

6.16 Summary

6.16.1 In line with the current guidance from NatureScot, a suite of ornithological surveys was adopted for the purposes of assessing the avian baseline conditions for the Proposed Development. The surveys comprised: Vantage Point (VP) surveys, breeding bird surveys, breeding Schedule 1 species surveys, black grouse surveys and winter walkover surveys. All surveys were undertaken between April 2021 and March 2024.

6.16.2 Six raptor and owl species of higher conservation value were registered during the full three years of surveys, namely goshawk, hen harrier, merlin, osprey, peregrine and red kite. Three raptor species of low conservation value (buzzard, kestrel and sparrowhawk) were also registered. Two of the observed species (peregrine and red kite) were assessed as breeding but neither were within 2 km of the site. A total of six species of waders were recorded breeding during walkover surveys (common sandpiper, curlew, golden plover, oystercatcher, lapwing and snipe). No black grouse leks were recorded.

6.16.3 Collision risk modelling was undertaken for six species (curlew, golden plover, goshawk, osprey, peregrine and red kite). The resultant collision values were very low, with the annual risk values predicted to be 0.04 or less for all six species.

6.16.4 A single SPA is located within 10 km, namely Muirkirk and North Lowther Uplands SPA which lies adjacent to the site. Due to the lack of breeding and flight activity within the site no effects were predicted on any qualifying species of the SPA.

6.16.5 A single SSSI is located within 10 km of the site, namely Muirkirk Uplands SSSI underpins the SPA and also lies in direct proximity to the site. Due to the lack of breeding and flight activity within the site, no effects were predicted on the qualifying species of the SSSI, connectivity was however identified with species recorded that are listed as part of the SSSI breeding bird assemblage (namely curlew, snipe, skylark and whinchat).

6.16.6 A total of four IOFs were taken forward for assessment, namely: Muirkirk Uplands SSSI: breeding bird assemblage (including curlew and snipe), Dungavel HMPA (hen harrier) and breeding waders (lapwing and oystercatcher).

6.16.7 With standard mitigation measures in place, all predicted effects were considered to be minor adverse or negligible and therefore not significant for all IOFs, with exception the of displacement/disturbance of Dungavel HMPA hen harrier during operation which was assessed as moderate adverse.

6.16.8 The Applicant has committed to additional mitigation and enhancement measures to further reduce adverse effects, and introduce improvements. Measures include the implementation of an extensive HMEP which will improve current and create new foraging and breeding habitats for ornithological features on the site, in particular aimed at hen harrier and breeding waders. The HMEP will lead to improved habitats for a broad range of other species including merlin and short-eared owl.

6.16.9 Residual effects, which take account of additional mitigation and enhancement measures, are predicted to largely remain the same as predicted effects, bar for Muirkirk Uplands SSSI: breeding bird assemblage, and breeding waders for which residual effects are predicted to be minor beneficial and Dungavel HMPA (hen harrier) for which residual effects are predicted to be minor-moderate beneficial.

6.16.10 Given that the magnitude of impacts of the Proposed Development on all IOFs would contribute very little to the overall cumulative effect for each potential impact at an NHZ 19 level, no cumulative assessment was considered necessary.

6.16.11 Given the conclusion of potential for likely significant effects due to the proximity of the Muirkirk and North Lowther Uplands SPA, a (shadow) HRA Appropriate Assessment has been carried out. This has concluded no adverse effects on the integrity of the SPA as a result of the Proposed Development.

Table 6.12 – Summary Table

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
During Construction & Decommissioning					
Muirkirk Uplands SSSI - Breeding Bird Assemblage: displaced due to disturbance/habitat loss.	Minor	Adverse	• Appointment of ECoW. • Pre-construction nest checks. • Breeding Bird SPP. • Timing of works. • CEMP.	Negligible	Adverse
Waders: displaced due to disturbance/habitat loss.	Negligible	Adverse	• Appointment of ECoW. • Pre-construction nest checks. • Breeding Bird SPP. • Timing of works. • CEMP	Negligible	Adverse
Dungavel HMPA	Negligible	Adverse	• Appointment of ECoW. • Pre-construction nest checks. • Breeding Bird SPP. • Timing of works. • CEMP	Negligible	Adverse
During Operation					
Muirkirk Uplands SSSI Breeding Bird Assemblage: displaced due to operating turbines or solar farm and/or habitat loss.	Minor	Adverse	Habitat Management and Enhancement Plan	Minor	Beneficial
Dungavel HMPA	Moderate	Adverse	Habitat Management and Enhancement Plan	Minor-Moderate	Beneficial
Breeding/foraging waders displaced due to operating turbines or solar farm and/or habitat loss.	Negligible	Adverse	Habitat Management and Enhancement Plan	Minor	Beneficial

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Potential injury or mortality of all IOFs to collision risk.	Negligible	Adverse	n/a	Negligible	Adverse
Aviation lighting-all IOFs	Negligible	Adverse	n/a	Negligible	Adverse
Cumulative Effects					
All IOFs	Negligible	Adverse	n/a	Negligible	Adverse

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