

8 ORNITHOLOGY

8.1 INTRODUCTION

This Chapter of the Environmental Impact Assessment (EIA) Report evaluates the potential effects of the Ackron Wind Farm (the Development) on Important Ornithological Features (IOFs). This assessment was undertaken by Lisette Coiffait, Senior Ornithologist, of Arcus Consultancy Services Limited (Arcus) who is a full member of the Chartered Institute of Ecology and Environmental Management (MCIEEM). The Chapter has been technically reviewed Heather Kwiatkowski, Principal EIA Consultant at Arcus and by Stuart Davidson, Registered EIA Practitioner and Operational Director at Arcus.

This Chapter is supported by the following figures provided in Volume 2a Figures excluding Landscape and Visual:

- Figure 8.1: Ornithology Study Areas;
- Figure 8.2: Vantage Points and Viewshed – 2014-2016;
- Figure 8.3: Vantage Points and Viewshed – 2018;
- Figure 8.4: Breeding Bird Territories 2014;
- Figure 8.5: Breeding Bird Territories 2015; and
- Figure 8.6: Breeding Bird Territories 2018,

This Chapter is supported by the following Technical Appendix documents provided in Volume 3 Technical Appendices:

- Appendix A8.1: Baseline Ornithology Report: 2014-16 (including Figures);
- Appendix A8.2: Baseline Ornithology Report: 2018 Breeding Season (including Figures);
- Appendix A8.3: Baseline Ornithology Surveys: Additional Survey Data;
- Appendix A8.4: Ornithology Collision Risk Modelling; and
- Appendix A8.5: Ornithology Confidential Annex.

This Chapter includes the following elements:

- Legislation, Policy and Guidance;
- Assessment Methodology and Significance Criteria;
- Baseline Conditions;
- Assessment of Potential Effects;
- Cumulative Effect Assessment;
- Mitigation;
- Residual Effects;
- Effects on Statutory Sites; and
- Statement of Significance.

The following terms are used within this Chapter to describe the Development and various associated study areas:

- The Development: the physical components of the Ackron Wind Farm, i.e. the turbines and all associated infrastructure, including the access track;
- The Site: the land within the Site Boundary;
- The Site Boundary: the red line or application boundary as shown in Figure 1.2;
- Turbine Envelope: the area within 500 m of the proposed turbine locations;
- Vantage Point (VP) Viewshed: the visible area within 2 km of a VP location, identified using GIS analysis;
- Collision Risk Zone (CRZ): the area within which target species were considered to be at risk of collision. For species following direct (regular) flight paths (e.g. geese) this was the area within the Turbine Envelope; for species following random

(irregular) flight paths (e.g. raptors) this was the visible area within the VP Viewsheds (see Section 8.3.7);

- Core Study Area: the northern section of the Site as shown in Figure 8.1;
- Survey Area: the area surveyed during a particular Baseline Ornithology Survey, which in all cases comprised the land within Core Study Area, and for some surveys, also included an appropriate Buffer Area around this:
 - 500 m for the Moorland Breeding Bird Surveys and Winter Bird Surveys;
 - 2 km for the Breeding Raptor Surveys;
 - extending to 6 km for eagle species in 2018; and
 - 2 km for the Breeding Diver Surveys.

Ornithology Survey Areas are shown in Figure 8.1.

- Buffer Area: the component of a Survey Area around (but not including) the Core Study Area;
- Rotor Swept Height (RSH): the height of the airspace that would be swept by the candidate turbine rotors when operational (i.e. 13.9-149.9 m); and
- Potential Collision Height (PCH): bird flight heights potentially within the RSH.

English (British) vernacular and scientific names of bird species referred to in this report follow the British List maintained by the British Ornithologists' Union (BOU)¹.

8.2 LEGISLATION, POLICY AND GUIDANCE

The following key guidance, legislation and information sources have been considered in carrying out this assessment.

8.2.1 Legislation

- European Union (Withdrawal) Act 2018²
- Directive 2009/147/EC on the Conservation of Wild Birds (Birds Directive)³;
- Directive 92/43/EEC on Conservation of Natural Habitats and of Wild Fauna and Flora (as amended) (Habitats Directive)⁴;
- The Conservation (Natural Habitats &c.) Regulations 1994 (as amended) (The Habitats Regulations)⁵;
- The Wildlife and Natural Environment (Scotland) Act 2011⁶;
- The Wildlife and Countryside Act 1981 (as amended)⁷;
- The Nature Conservation (Scotland) Act 2004 (as amended)⁸;
- The Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2012⁹;

¹ British Ornithologists' Union. (2017) The British List: A Checklist of Birds of Britain (9th edition). *Ibis* 160, 190-240.

² UK Government (2018) European Union (Withdrawal) Act 2018 [Online] Available at: <http://www.legislation.gov.uk/ukpga/2018/16/contents> (Accessed 27/08/20)

³ European Parliament (2009) Directive 2009/147/EC [Online] Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009L0147&from=EN> (Accessed 27/08/20)

⁴ European Parliament (1992) Directive 92/43/EEC [Online] Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31992L0043&from=EN> (Accessed 27/08/20)

⁵ European Parliament (1994) the Conservation (Natural Habitats, &c.) Regulations 1994 [Online] Available at: <http://www.legislation.gov.uk/uksi/1994/2716/contents/made> (Accessed 27/08/20)

⁶ Scottish Government (2011) Wildlife and Natural Environment (Scotland) Act 2011 [Online] Available at: <http://www.legislation.gov.uk/asp/2011/6/contents/enacted> (Accessed 27/08/20)

⁷ UK Government (1981) The Wildlife and Countryside Act 1981 (as amended) [Online] Available at: <http://www.legislation.gov.uk/ukpga/1981/69> (Accessed 27/08/20)

⁸ UK Government (2004) Nature Conservation (Scotland) Act 2004 [Online] Available at: <http://www.legislation.gov.uk/asp/2004/6/contents> (Accessed 27/08/20)

⁹ Scottish Government (2012) the Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2012 [Online] Available at: <https://www.legislation.gov.uk/ssi/2012/228/contents/made> (Accessed 27/08/20)

- The Conservation of Habitats and Species (Amendment) Regulations 2017¹⁰, relating to reserved matters in Scotland;
- Environmental Impact Assessment Directive 2014/52/EU¹¹; and
- The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017¹².

8.2.2 Planning Policy

- UK Post-2010 Biodiversity Framework¹³;
- Scottish Biodiversity Strategy: It's in Your Hands¹⁴;
- 2020 Challenge for Scotland's Biodiversity¹⁵;
- PAN 60: Planning for Natural Heritage¹⁶;
- Planning Advice Note 1/2013-Environmental Impact Assessment, Revision 1.0¹⁷; and
- Highland-wide Local Development Plan¹⁸.

8.2.3 Guidance and Information

- Developing field and analytical methods to assess avian collision risk at wind farms¹⁹;
- Scottish Raptor Monitoring Scheme Report 2018²⁰;
- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine²¹;
- Birds of Caithness including The Breeding & Wintering Atlas 2007-2012²²;

¹⁰ UK Government (2017) The Conservation of Habitats and Species Regulations 2017 [Online] Available at: <http://www.legislation.gov.uk/ukxi/2017/1012/contents/made> (Accessed 27/08/20)

¹¹ European Parliament (2014) Directive 2014/52/EU [Online] Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32014L0052> (Accessed 27/08/20)

¹² Scottish Government (2017) the Town and Country Planning (EIA) (Scotland) Regulations [Online] Available at: <http://www.legislation.gov.uk/ssi/2017/102/contents/made> (Accessed 27/08/20)

¹³ Four Countries' Biodiversity Group (2010) UK Post-2010 Biodiversity Framework [Online] Available at: <http://data.jncc.gov.uk/data/587024ff-864f-4d1d-a669-f38cb448abdc/UK-Post2010-Biodiversity-Framework-2012.pdf> (Accessed 27/08/20)

¹⁴ Scottish Executive (2004) Scotland's Biodiversity It's in your Hands [Online] Available at: <https://www.webarchive.org.uk/wayback/archive/20180515152802/http://www.gov.scot/Publications/2004/05/19366/37250> (Accessed 27/08/20)

¹⁵ Scottish Government (2013) 2020 Challenge for Scotland's Biodiversity [Online] Available at: <https://www.gov.scot/publications/2020-challenge-scotlands-biodiversity-strategy-conservation-enhancement-biodiversity-scotland/> (Accessed 27/08/20)

¹⁶ Scottish Government (2000) PAN 60: Planning for Natural Heritage [Online] Available at: <https://www2.gov.scot/Publications/2000/08/pan60-root/pan60> (Accessed 27/08/20)

¹⁷ Scottish Government (2013) PAN 1/2013: EIA [Online] Available at: <https://www.gov.scot/publications/planning-advice-note-1-2013-environmental-impact-assessment/> (Accessed 27/08/20)

¹⁸ The Highland Council (2012) Highland-wide Local Development Plan [Online] Available at: https://www.highland.gov.uk/info/178/local_and_statutory_development_plans/199/highland-wide_local_development_plan (Accessed 27/08/20)

¹⁹ Band, W., Madders, M. & Whitfield, D.P. (2007) *Developing field and analytical methods to assess avian collision risk at wind farms*. In de Lucas, M., Janss, G. & Ferrer, M. (eds.) *Birds and Wind Power*. Quercus, Madrid.

²⁰ Challis, A., Eaton, M., Wilson, M.W., Holling, M., Stevenson, A. & Stirling-Aird, P. (2019). *Scottish Raptor Monitoring Scheme Report 2018*. BTO Scotland, Stirling.

²¹ CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine*. Chartered Institute of Ecology and Environmental Management, Winchester.

²² Davey, P., Manson, S., Maughan, E., Omand, D. & Smith, J. (eds) (2015) *Birds of Caithness including The Breeding & Wintering Atlas 2007-2012*. Caithness SOC.

- Birds of Conservation Concern (BoCC) 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man²³;
- Wind Energy Developments and Natura 2000²⁴;
- The Birds of Scotland²⁵;
- Bird Monitoring Methods²⁶;
- Raptors: a field guide to survey and monitoring, 3rd edition²⁷;
- A Review of Disturbance Distances in Selected Bird Species²⁸;
- The Scottish Biodiversity List (SBL)²⁹;
- Windfarms and birds: calculating a theoretical collision risk assuming no avoidance action³⁰;
- Assessing connectivity with Special Protection Areas (SPAs)³¹;
- Environmental Statements and Annexes of Environmentally Sensitive Bird Information; Guidance for Developers, Consultants and Consultees³²;
- Recommended bird survey methods to inform impact assessment of onshore wind farms³³;
- Assessing significance of impacts from onshore wind farms on birds outwith designated areas³⁴;
- Assessing the cumulative impacts of onshore wind farms on birds³⁵;
- Environmental Impact Assessment Handbook³⁶;
- Cumulative Collision Risk Spreadsheet³⁷;
- Sutherland Birdlife³⁸; and
- Natural Heritage Zone Bird Population Estimates³⁹.

Note that additional sources of information used only occasionally are referenced in the text where relevant.

²³ Eaton M.A., Aebischer N.J., Brown A.F., Hearn R.D., Lock L., Musgrove A.J., Noble D.G., Stroud D.A. and Gregory R.D. (2015). Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. *British Birds* 108, 708–746.

²⁴ European Commission (2011). Natura 2000 Guidance Document 'Wind Energy Developments and Natura 2000'. European Commission, Brussels.

²⁵ Forrester, R.W., Andrews, I.J., McInerney, C.J., Murray, R.D., McGowan, R.Y., Zonfrillo, B., Betts, M.W., Jardine, D.C., & Grundy, D.S. (eds) (2007) *The Birds of Scotland*. The Scottish Ornithologists Club, Aberlady.

²⁶ Gilbert, G., Gibbons, D.W. & Evans, J. 1998. *Bird monitoring methods*. RSPB, Sandy.

²⁷ Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. & Thompson, D. (2013). *Raptors: a field guide to survey and monitoring*, 3rd edition. The Stationery Office, Edinburgh

²⁸ Ruddock, M. & Whitfield, D.P. (2007). *A Review of Disturbance Distances in Selected Bird Species*. A report from Natural Research (Projects) Ltd to Scottish Natural Heritage

²⁹ <https://www.webarchive.org.uk/wayback/archive/20160402063428/http://www.gov.scot/Topics/Environment/Wildlife-Habitats/16118/Biodiversitylist/SBL>

³⁰ Scottish Natural Heritage (SNH) (2000). Windfarms and birds: calculating a theoretical collision risk assuming no avoidance action. SNH Guidance Note.

³¹ SNH (2016a). *Assessing connectivity with Special Protection Areas (SPAs)*, Version 3.

³² SNH (2016b). *Environmental Statements and Annexes of Environmentally Sensitive Bird Information; Guidance for Developers, Consultants and Consultees*, Version 2.

³³ SNH (2017). *Recommended bird survey methods to inform impact assessment of onshore wind farms*, Version 2.

³⁴ SNH (2018a). *Assessing significance of impacts from onshore wind farms on birds outwith designated areas*, Version 2.

³⁵ SNH (2018b). *Assessing the cumulative impacts of onshore wind farms on birds*. SNH Guidance Note.

³⁶ SNH (2018c). *Environmental Impact Assessment Handbook – Version 5: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland*.

³⁷ A Cumulative Collision Risk Spreadsheet for Caithness, dated 06/05/2020 was provided by SNH and has been used for the Cumulative Effect Assessment (Section 8.6).

³⁸ Symonds, F. & Vittery, A. (2018). *Sutherland Birdlife*. Independent Publishing Network.

³⁹ Wilson, M.W., Austin, G.E., Gillings S. & Wernham, C.V. (2015) *Natural Heritage Zone Bird Population Estimates*. SWBSG Commissioned report number SWBSG_1504.

8.3 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

8.3.1 *Scoping Responses and Consultations*

8.3.1.1 *2015 Scoping Report*

A formal Scoping Request for a similar scale wind farm development within the same land option was submitted to The Highland Council (the Council) by WPD in March 2015 (Reference 15/01125/SCOP).

In their response (dated 14/05/2015), the Council noted that the EIA Report should address the likely impacts on the nature conservation interests of all designated sites in the vicinity of the Development. They further stated that the EIA Report should include proposed mitigation to avoid any potential impacts, or reduce them to a level where they are not significant. With respect to ornithology, the Council advised that the ornithological baseline at the Site should be established for inclusion in the EIA Report, including the presence of any bird species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended).

In their response (dated 15/04/2015), NatureScot⁴⁰ noted that the Development is within the foraging range of the qualifying interests of the Caithness and Sutherland Peatlands SPA, as well as certain qualifying features, of the East Halladale Site of Special Scientific Interest (SSSI) (which is a component of the SPA), namely breeding golden plover (*Pluvialis apricaria*) and dunlin (*Calidris alpina*). They advised that both direct and indirect impacts on protected sites and their ornithological interests would require full assessment as part of the EIA process.

8.3.1.2 *Further Consultation with NatureScot (2018)*

A request for informal scoping advice regarding key ornithological features and the scope of the 2018 baseline ornithology surveys was submitted to NatureScot by Avian Ecology on 06/04/2018. It is understood that the request was supported by a brief report outlining the ornithology surveys completed in 2014-16 and summarising the proposed scope of the 2018 ornithology work.

In their response (sent to Avian Ecology via email on 16/04/2018), NatureScot stated that, in general, the proposed approach to the ornithological survey work was reasonable and proportionate, but recommended that the proposed Breeding Raptor Survey Area should be extended to 6 km for golden eagle (*Aquila chrysaetos*). However, as NatureScot did not have any records of breeding golden eagle within this search area, they further advised that the Highland Raptor Study Group (HRSG) should be consulted to obtain the most up-to-date information, which should be used to inform survey requirements.

Following on from this, a request was made to NatureScot (by Avian Ecology, via email dated 16/04/2018) to comment on the proposal to scope out consideration of potential impacts on the qualifying ornithological interests of the following statutory sites:

- West Halladale SSSI;
- North Caithness Cliffs SPA; and
- Red Point Coast SSSI.

In their response (to Avian Ecology via telephone on 17/04/2018), NatureScot stated that their current position was that potential impacts on the North Caithness Cliffs SPA and Red Point Coast SSSI were unlikely and could be scoped out. NatureScot further advised that potential impacts on the West Halladale SSSI should be considered, since it forms a component of the adjacent Caithness and Sutherland Peatlands SPA, but based on the

⁴⁰ Scottish Natural Heritage (SNH) rebranded in August 2020 as NatureScot. Where relevant reference is still made to SNH within this chapter in respect of guidance which remains valid and is yet to be republished

information provided to date, it was unlikely that potential ornithological impacts would represent a 'show stopping' constraint.

Following completion of the 2018 breeding season ornithology surveys, a further request was made to NatureScot (by Avian Ecology, via email dated 01/11/2018) for comment on the requirement for further surveys to inform a planning application, anticipated in 2020. The request was supported by a brief report summarising the ornithology data collected to date. In their response (to Avian Ecology via email dated 03/12/2018), NatureScot stated that the information submitted appeared to be acceptable. However, the following points were noted:

- Submission of an application in early 2020 would allow inclusion of two years of breeding bird survey data collected within the previous five years;
- A 2020 submission date would only allow inclusion of one year of non-breeding bird survey data collected within the previous five years if no further non-breeding season surveys were completed. However, this was not considered to be critical because the SPA/SSSI bird interest is for breeding birds⁴¹;
- There is potential connectivity between the Site and the Caithness and Sutherland Peatlands SPA breeding merlin (*Falco columbarius*) population. It was further noted that, although NatureScot guidance³¹ does not include a core foraging range for merlin, it does state that birds can forage up to 5 km from the nest. NatureScot therefore advised that potential impacts on merlin should be assessed in relation to the Caithness and Sutherland Peatlands SPA; and
- Assessment of impacts on Arctic tern (*Sterna paradisaea*) should be completed at the Natural Heritage Zone (NHZ) level.

8.3.13 2019 Scoping Reports

A Scoping Report was submitted to the Council in April 2019 (April 2019 Scoping Report). Subsequently, the Applicant extended the Site area to the south and west. An Ornithological Consultation Letter was therefore submitted to NatureScot in September 2019 and an updated Scoping Report (the Updated Scoping Report) was submitted to the Council in October 2019. A summary of the responses received relating to ornithology, and details of how these comments have been addressed, are provided in Table 8.1.

Table 8.1: 2019 Consultation Responses with Relevance to Ornithology

| Consultee | NatureScot | |
|---|---|--|
| Type and Date | Scoping Response, 06/05/19 | |
| Topic | Comment | Response |
| Assessment of qualifying interests of statutory sites | <p>Noted that the Development abuts the boundary of the Caithness & Sutherland Peatlands SPA and Ramsar site, which is protected for upland breeding birds.</p> <p>Advised that "past bird data" indicates potential connectivity between the Development and several qualifying interests of the SPA, and the Development could potentially affect these SPA populations. Therefore, detailed assessments should be carried out using the SPA Conservation Objectives.</p> | <p>Potential impacts on qualifying ornithological interests of the Caithness & Sutherland Peatlands SPA and Ramsar site have been scoped into the assessment.</p> <p>As advised, the assessment was completed with reference to the Conservation Objectives of the SPA.</p> <p>See Section 8.5</p> |

⁴¹ Specific statutory sites were not named, but this is presumed to refer to the Caithness and Sutherland Peatland SPA and Ramsar site, and North Caithness Cliffs SPA, as well as the component SSSIs.

| Consultee | NatureScot | |
|---|---|--|
| Type and Date | Scoping Response, 06/05/19 | |
| Topic | Comment | Response |
| Assessment of qualifying interests of statutory sites | Commented that the proposal also lies directly adjacent to the north end of East Halladale SSSI, protected for its blanket bog, breeding bird assemblage, dunlin and golden plover, and any potential impacts on designated features should be assessed and presented within the EIA Report. Further noted that the breeding bird assemblage list to be considered is "Upland moorland with water bodies ⁴² ." | Potential impacts on qualifying ornithological interests of this SSSI were scoped into the assessment, and reference was made to the cited breeding bird assemblage list as advised. See Section 8.5 |
| Potential connectivity with statutory sites | Advised that most of the Caithness & Sutherland Peatlands Ramsar site interests are covered by the SSSI comments above, but noted NatureScot believe the general area is well used by summer/early autumn greylag geese (<i>Anser anser</i>), which could be attributed to this Ramsar site. Noted that Vantage Point (VP) survey results should indicate whether greylag geese are considered to be at risk from Development. Further noted that late evening VP watches in early autumn may help to identify any roosting behaviour and flight lines. | As noted above, potential impacts on qualifying ornithological interests of the Caithness & Sutherland Peatlands SPA and Ramsar site were scoped in to the assessment. Note, however, that information on greylag geese in the Ramsar site Information Sheet (RIS) ⁴³ is unclear ⁴⁴ . Flight Activity Surveys were completed year-round, and included late evening watches during the autumn. Greylag goose flight activity was relatively low and there was no evidence of roosting in the vicinity of the Site. See Sections 8.3.6, 8.4.2, 8.5 and 8.9 and Appendix A8.1 |
| Ornithological Impact Assessment and survey methods | Advised that upland birds not connected to a protected area should be assessed against the NHZ populations ³⁴ and recommended that surveys should follow NatureScot best practice guidelines ³³ . | Surveys followed prevailing NatureScot guidance, namely NatureScot (2017) ³³ and relevant versions at the time of the surveys. As advised, and in line with the cited NatureScot guidance ³⁴ , birds not connected to a protected area have been assessed against the relevant NHZ population (NHZ 5: Peatlands of Caithness and Sutherland). See Sections 8.3.6 and 8.5 |

⁴² Drewitt, A.L., Whitehead, S. and Cohen, S. 2015. *Guidelines for the Selection of Biological SSSIs. Part 2: Detailed Guidelines for Habitats and Species Groups. Chapter 17 Birds*. Joint Nature Conservation Committee, Peterborough.

⁴³ Joint Nature Conservation Committee (2005). Information Sheet on Ramsar Wetlands (RIS): Site UK13003, Caithness and Sutherland Peatlands. Available online at: <https://sitelink.nature.scot/site/8412> (Accessed 27/08/2020).

⁴⁴ The RIS for this site⁴³ states in the overview that it "supports a diverse range of breeding waterfowl including internationally important populations of North Scottish greylag goose and dunlin". However, in the same document, under Ramsar criterion 6 – species/populations occurring at levels of international importance, only dunlin is listed (and no population estimate is provided for greylag goose).

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|--|--|-----------------|
| Consultee | NatureScot | |
| Type and Date | Consultation Letter, 27/09/2019 | |
| Topic | Comment | Response |
| Extension to Site Boundary and further survey requirements | Confirmed that, since the revised turbine layout is within the viewsheds of the VP surveys already undertaken, and the areas previously surveyed during baseline ornithology surveys, the completed survey work is sufficient to assess the impacts of the revised turbine layout. | N/A |

| | | |
|--|--|--|
| Consultee | Royal Society for the Protection of Birds (RSPB) | |
| Type and Date | Scoping Response, 08/05/19 | |
| Topic | Comment | Response |
| Statutory sites, protected species and species of conservation concern | Noted that the Development is adjacent to the Caithness & Sutherland Peatlands SPA and that the Site and surrounding area are currently used by a number of Birds listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) ⁷ , Annex I of the Birds Directive ³ and/or the UK BoCC Red and Amber lists ²³ . | Potential impacts of all IOFs, including qualifying interests of the SPA (where potential connectivity exists) and other species included on the relevant lists have been fully assessed. See Section 8.5 |
| Habitats Regulation Appraisal | Advised that a Habitats Regulation Appraisal (HRA) will be required and stressed the importance of gathering sufficient information to inform an Appropriate Assessment (AA). | Information sufficient to inform an AA is presented in Section 8.9 |
| Ornithological features scoped into assessment | Confirmed that, in general, they were content with the statutory sites and species scoped into assessment but noted that Section 7.6.1 of the April 2019 Scoping Report incorrectly refers to the Caithness and Sutherlands SPA and Ramsar site as the "Caithness Cliffs SPA and Ramsar site". | The typographical error in Section 7.6.1 of the April 2019 Scoping Report is acknowledged. Potential effects on qualifying ornithological interests of the Caithness and Sutherlands SPA and Ramsar site were scoped into the assessment. See Section 8.5 |
| Ornithological features scoped into assessment | Advised that the potential for impacts on common scoter (<i>Melanitta nigra</i>) should be scoped into the assessment as there are breeding records of this species within 2 km of the Development. | No common scoters were recorded during the baseline surveys completed in 2014-16 or 2018. The RSPB subsequently confirmed that they did not hold any breeding common scoter records within 2 km of the Site. In early 2020 historical records of this species were obtained from the RSPB, British Trust for Ornithology (BTO) and NatureScot as part of the Desk Study. The closest potential breeding record was approximately 4.5 km from the Site. |

| Consultee | Royal Society for the Protection of Birds (RSPB) | |
|--|--|--|
| Type and Date | Scoping Response, 08/05/19 | |
| Topic | Comment | Response |
| | | <p>However, there was an anecdotal record of this species during a Site visit in 2020 and it has been scoped into the assessment.</p> <p>See Sections 8.3.5, 8.4.1.2 and 8.5</p> |
| Ornithological features scoped into assessment | <p>Advised that the North Caithness Cliffs SPA should be scoped into the assessment as it is located within 2 km of the Development and peregrine is a qualifying feature.</p> | <p>Potential effects on peregrine and the North Caithness Cliffs SPA have been scoped into the assessment as requested by the RSPB.</p> <p>See Sections 8.5 and 8.9</p> |
| Scoping exercise | <p>Criticised the fact that baseline survey work had progressed further than they would generally expect at the scoping stage and commented that consequently the scoping exercise was of less use than it would have been if carried out prior to commencement of surveys.</p> | <p>As noted above, RSPB confirmed that, in general, they were content with the statutory sites and species scoped into the assessment. A Scoping Report was previously submitted in 2015. Subsequent consultation with NatureScot also took place in April 2018 and November/December 2018, during which NatureScot confirmed that the approach to the 2018 ornithological survey work was reasonable and proportionate.</p> <p>See Section 8.3.1</p> |
| Suitability of baseline data | <p>Expressed their opinion that, due to the age of the initial survey work completed in 2014/15 and the planned submission date of 2020, the limited information provided in the April 2019 Scoping Report was insufficient to demonstrate that the additional survey effort in 2018 was adequate, and therefore reserved judgement on this.</p> | <p>Rather than presenting detailed ornithological baseline information, the aim of the April 2019 Scoping Report was to determine the ecological issues to be addressed in the Ecological Impact Assessment (EcIA) and confirm the assessment approach. This is in line with current Chartered Institute of Ecology and Environmental Management (CIEEM) guidance²¹. As such, the baseline information presented in the April 2019 Scoping Report was a summary only.</p> <p>As noted above, NatureScot confirmed that the approach to the 2018 ornithological survey work was reasonable and proportionate. They further advised that submission of an application in early 2020 would allow inclusion of two years of breeding bird survey data collected within the previous five years and that, while this approach would only allow inclusion of one year of non-breeding bird survey data collected within the previous five years, this was not critical because the SPA/Site of Special Scientific Interest (SSSI) bird interest is for breeding birds.</p> <p>See Section 8.3.1</p> |

| | | |
|------------------------------------|---|--|
| Consultee | Royal Society for the Protection of Birds (RSPB) | |
| Type and Date | Scoping Response, 08/05/19 | |
| Topic | Comment | Response |
| Information included in EIA Report | <p>Recommended that additional information should be provided within the EIA Report to demonstrate that the survey data are adequate, robust and accurate, including the following:</p> <ul style="list-style-type: none"> ▪ Full information on the VP work undertaken, including dates, times and weather conditions; ▪ Maps showing VP locations that also denote viewsheds; ▪ Worked example(s) of collision risk calculations; and ▪ Provision of raw data in order for independent verification of collision risk calculations. | <p>Detailed information, including that listed, is provided in this Chapter and associated Technical Appendices.</p> <p>See Section 8.3.6, Figures 8.2 and 8.3 and Appendices A8.1 to A8.4</p> |
| Cumulative impact assessment | <p>Noted that cumulative impacts on species sensitive to wind energy developments should be assessed across the relevant NHZ and in relation to the Caithness and Sutherland Peatlands SPA, and should include all existing and proposed wind farms in the NHZ.</p> | <p>Potential cumulative impacts on IOFs have been assessed. As advised, and in line with NatureScot guidance^{31,34}, where there is potential connectivity with an SPA, potential impacts on the SPA population have been assessed, while birds not connected to a protected area have been assessed against the NHZ 5 population.</p> <p>See Section 8.6</p> |

| | | |
|--|--|---|
| Consultee | RSPB | |
| Type and Date | Updated Scoping Response, 13/11/19 | |
| Topic | Comment | Response |
| Ornithological features scoped into assessment | <p>Commented that they were pleased to see that their recommendation to include common scoter and the North Caithness Cliffs SPA in the assessment had been taken on board.</p> | N/A |
| Common scoter records | <p>Confirmed that the RSPB do not hold any recent breeding common scoter records within 2 km of the Site, but advised that the Forsinard Flyfishers use the lochs surrounding the area and are likely to send their returns to the Bighouse Estate, which could include more recent scoter sightings within 2 km of the Development.</p> | <p>Both Forsinard Flyfishers and the Bighouse Estate were contacted in early April 2020 to request any common scoter records. The Bighouse Estate replied on 09/04/2020 stating that they did not hold any records. No response was received from Forsinard Flyfishers.</p> <p>See Sections 8.3.5 and 8.4.1.2</p> |

| Consultee | RSPB | |
|---|--|---|
| Type and Date | Updated Scoping Response, 13/11/19 | |
| Topic | Comment | Response |
| Common scoter | <p>Clarified that their concern regarding common scoter includes the potential for collision with turbines during nocturnal migration to breeding lochs on the RSPB Forsinard Flows reserve. Stated that wildfowl often migrate at night and therefore VP surveys are unlikely to record them, which may result in an unreliable collision risk assessment. Further stated that scoters are also known to feed at sea during the breeding season and it is possible that birds breeding in the Caithness and Sutherland Peatlands SPA could commute through the Site, increasing the likelihood of collision risk. Advised that it may be useful to obtain scoter records from further afield than 2 km to try and make a more accurate assessment of this risk and noted that they would be happy to supply this information if required.</p> | <p>Common scoter records within 10 km of the Site were obtained from the RSPB in both 2018 and 2020 as part of the Desk Study. Additional records were also sought from other organisations including the BTO and NatureScot.</p> <p>Although common scoter was not recorded during any surveys, there was an anecdotal record of it in 2020 and potential impacts on this species, including on nocturnal migrants, have been assessed.</p> <p>See Sections 8.3.5, 8.4.1.2 and 8.5</p> |
| Potential barrier effects on breeding diver species | <p>Noted that red-throated diver (<i>Gavia stellata</i>) and black-throated diver (<i>G. arctica</i>) commute from breeding lochs in the Caithness and Sutherland Peatlands SPA, northwards to the sea to feed, and since the Development is located between breeding and foraging locations, it could create a barrier for diver species. Advised that this potential impact should be addressed in the ornithological impact assessment.</p> | <p>The OIA includes a consideration of barrier effects on birds, including both diver species.</p> <p>See Sections 8.5 and 8.6</p> |
| Cumulative impact assessment | <p>Commented that there are many other proposed and operational developments directly adjacent to the SPA with similar predicted impacts on ornithological features and highlighted that the Updated Scoping Report implied that the ornithological impact assessment would only be undertaken at the NHZ population level, whereas specific cumulative impact assessments for the nearby Caithness and Sutherland Peatlands SPA and North Caithness Cliffs SPA should be completed.</p> | <p>As noted above, where there is potential connectivity with an SPA, potential cumulative effects on the SPA population have been assessed, while potential cumulative effects on birds not connected to a protected area have been assessed against the NHZ 5 population.</p> <p>See Section 8.6</p> |

| | | |
|--|---|---|
| Consultee | The Highland Council | |
| Type and Date | Scoping Response, 06/06/19 | |
| Topic | Comment | Response |
| Baseline surveys and Ornithological Impact Assessment | Advised that the ES should provide a baseline survey of the bird interest on Site, and should categorically establish which species are present on Site and where. Further advised that the presence of protected species such as Schedule 1 birds must be included and considered as part of the planning application process. | A comprehensive programme of Baseline Ornithology Surveys was completed. All IOFs, including protected bird species, have been identified and fully considered as part of the Ornithological Impact Assessment. See Sections 8.3.5, 8.3.6, 8.4 and 8.5 |
| Assessment of impacts on of statutory sites and mitigation | Stated that the EIA Report should address the likely impacts on the nature conservation interests of all designated sites in the vicinity of the Development and noted that key issues to be addressed include potential impacts on the Caithness & Sutherland Peatlands SPA and East Halladale SSSI. Further advised that the EIA Report should include proposals for any mitigation required to avoid potential impacts or to reduce them to a level where they are not significant. | Potential impacts on all IOFs, including qualifying ornithological interests of the Caithness & Sutherland Peatlands SPA and Ramsar site and the East Halladale SSSI (where there is potential connectivity) have been scoped into the assessment. Mitigation measures have also been proposed where necessary. See Sections 8.3.10, 8.5, 8.7 and 8.9 |

8.3.2 Scope of Assessment

The key issues for the assessment of potential ornithological effects relating to the Development are:

- Direct loss of breeding, foraging and/or roosting habitat through construction of the Development;
- Displacement of birds through direct and indirect loss of habitat as a result of disturbance associated with construction or decommissioning activity, turbine operation and maintenance, or visitor disturbance. This also includes barrier effects to commuting or migrating birds due to the presence of wind turbines or other infrastructure;
- Death or injury through collision with turbine blades or other types of infrastructure associated with the Development; and
- Cumulative effects on SPA and/or NHZ populations, resulting from construction, operation and decommissioning of the Development in conjunction with other developments that may also impact on the same populations.

8.3.3 Elements Scoped Out of Assessment

Based on the baseline conditions recorded and distance from the Site, effects on qualifying ornithological interests of the following statutory sites have been scoped out of the assessment:

- Red Point Coast SSSI; and
- Lochan Buidhe Mires SSSI.

In addition, bird species considered to be of local importance (see Sections 8.3 and 8.5.2) are scoped out of the assessment. Embedded mitigation (described in Section 8.3.10)

will be implemented to ensure that all breeding bird species, including those of local importance, are protected.

8.3.4 Core Study Area / Ornithology Survey Areas

The Core Study Area and Ornithology Survey Areas are defined in Section 8.1 and shown in Figure 8.1.

8.3.5 Desk Study Methods

A Desk Study was undertaken to provide information on the ornithological interest of the Site and its surrounds, including the locations of any relevant statutory protected sites.

A search was made for all statutory protected nature conservation sites within 10 km of the Site, and for SPAs and Ramsar Sites within 20 km. In addition, the following sources of information were consulted for the Desk Study exercise:

- NatureScot SiteLink website⁴⁵ for statutory designated site information;
- Records of nesting/roosting eagle species within 6 km of the Site, and other protected raptor species within 2 km, were obtained from the HRSG in February 2020;
- An initial data request was made to the RSPB in 2018 for records of bird species of conservation concern within 10 km of the Core Study Area. To obtain the most up-to-date records, a further request for the following data, recorded within the last ten years, was made to the RSPB in February 2020:
 - All records of protected species and species of conservation concern within 2 km of the Site;
 - Additional records of nesting/roosting eagle species within 6 km of the Site; and
 - Additional records of common scoter from Caithness and Sutherland;
- The following data was requested from NatureScot in February 2020:
 - Common scoter data from the last national survey in 2007;
 - Any records of breeding Schedule 1 species and other species of conservation concern within 2 km of the Site; and
 - Additional records of nesting/roosting eagle species within 6 km of the Site.
- Records of common scoter within NC85, NC86, NC95 and NC96 were requested from the BTO;
- Records of common scoter were requested from Forsinard Flyfishers and the Bighouse Estate in April 2020;
- An appraisal of the likely significant effect of Beinneun Wind Farm on the breeding common scoter population associated with the West Inverness-shire Lochs SPA⁴⁶;
- Publicly available documents associated with the proposed Drum Hollistan and Drum Hollistan 2 Wind Farm developments⁴⁷, which border the Site to the north-east; and
- Expert opinion on potential effects of the Development on common scoter was sought from Carl Mitchell, Principal Research Officer at the Wildfowl and Wetlands Trust (WWT), was sought in April 2010.

⁴⁵ SNH (2020) Site Link [Online] Available at: <https://sitelink.nature.scot/home> (Accessed 27/08/20)

⁴⁶ Arcus (2011) *Beinneun Wind Farm Environmental Statement Technical Appendix A8.2: Appraisal of the Likely Significant Effect on common scoter associated with the West Inverness-shire Lochs SPA*. Available via The Highland Council Planning portal (Planning Reference 11/04152/S36).

⁴⁷ Cumulative cut-off date of 15th September 2020

Note that additional literature was consulted during the course of the assessment, including the sources of information listed in Section 8.2.3; these are cited where relevant.

8.3.6 *Baseline Survey Methods*

Baseline Ornithology Surveys were completed over two periods:

- 2014-16: Initial Baseline Ornithology Surveys were completed by RPS between April 2014 and March 2016 (inclusive); and
- 2018 breeding season: Update Baseline Ornithology Surveys were completed by Avian Ecology between February 2017 and August 2018 (inclusive), thus covering early spring as well as the full breeding season (April to August). Survey methods were generally consistent with those completed previously, but took into account revisions to key guidance that occurred since the initial surveys were completed in 2014-16.

For each survey type, behavioural observations of the relevant species and other evidence of species presence were recorded in the field on large scale maps. Survey timings and weather conditions were also recorded for each survey visit; full details are presented in Appendices A8.1-A8.3.

A list of the Baseline Ornithology Surveys carried out during each survey year is presented in Table 8.2. Note that the 2018 Baseline Ornithology Surveys took place over a 7-month period, while surveys in 2014-15 and 2015-16 each took place over a 12-month period.

Table 8.2: Summary of Baseline Ornithology Surveys Completed in 2014-16 and 2018

| Survey type | Survey period (months are inclusive) | Survey effort/frequency | 2014-15 (Apr-Mar) | 2015-16 (Apr-Mar) | 2018 (Feb-Aug) |
|---|---|--|-------------------|-------------------|----------------|
| Breeding Season Flight Activity Surveys | 2014 & 2016: Apr-Aug; 2018: Feb-Aug | 2014: 54 hrs/VP 2015: 48 hrs/VP 2018: 72 hrs/VP* | ✓ | ✓ | ✓ |
| Non-breeding Season Flight Activity Surveys | 2014-15 & 2015-16: Sep-Mar | 2014-15: 42 hrs/VP 2015-16: 42 hrs/VP | ✓ | ✓ | |
| Moorland Breeding Bird Surveys | All years: Apr-Jul | 4 visits | ✓ | ✓ | ✓ |
| Breeding Raptor Surveys | 2014-16: Apr-Aug 2018: Feb-Aug | Monthly visits | ✓ | ✓ | ✓ |
| Breeding Diver Surveys | 2014-16: May-Aug; 2018: Jun-Aug | Monthly visits | ✓ | ✓ | ✓ |
| Focal Loch Watches | 2014: Jun-Jul; 2015: Jul-Aug; 2018: Aug | 2014: 57 hrs 2015: 110.5 hrs 2018: 24 hrs | ✓ | ✓ | ✓ |
| Winter Bird Surveys | 2014-15: Nov-Feb 2015-16: Oct-Feb | 3 visits | ✓ | ✓ | |
| *Including a minimum of 48 hrs/VP during the core breeding season (April to August inclusive) | | | | | |

Details of the methods followed for each survey are provided below; further details of survey dates and weather conditions are provided in Appendices A8.1 to A8.3.

8.3.6.1 Flight Activity Surveys

Flight Activity Surveys were conducted in 2014-16 and during the 2018 breeding season to record target species flight activity over the Core Study Area and allow collision risk to these species to be estimated.

The surveys involved a series of watches from VPs that afforded good views over the Core Study Area, and followed NatureScot guidance that was current at the time⁴⁸. In accordance with this guidance, flight lines of all target species passing through the VP viewsheds (see below) were mapped in the field. Each recorded flight line was numbered and cross-referenced to the following flight information, which was recorded on standardised survey forms:

- Species, age and sex (where identification of age/sex is possible);
- Number of birds;
- Time (when first seen);
- Duration of flight; and
- Flight height at 15 second intervals, recorded in a series of height bands.

Height bands differed between survey periods:

- The 2014-16 Flight Activity Surveys used five height bands:
 - Height band 1: <20 m;
 - Height band 2: 20-40m;
 - Height band 3: 40-100m;
 - Height band 4: 100-150 m; and
 - Height band 5: >150 m.
- The 2018 Flight Activity Surveys used three height bands:
 - Height band 1: <20 m;
 - Height band 2: 20-150 m; and
 - Height band 3: >150 m.

In addition to recording target species flight activity, in accordance with NatureScot guidance⁴⁸, activity of secondary species was summarised during the 2018 surveys at regular intervals. It is assumed that secondary species were also recorded during the 2014-16 surveys, although this dataset was not provided by RPS.

In all years, surveys covered all times of day including dawn and dusk periods. Each watch lasted three hours with a minimum 30-minute break in between watches.

Target and Secondary Species

Target species included the following:

- All goose, swan and duck species, with the exception of mallard (*Anas platyrhynchos*) in 2018 only;
- All diver species;
- Grey heron (*Ardea cinerea*);
- All raptor species (including owls) listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) and/or Annex I of the Birds Directive, and kestrel (*Falco tinnunculus*) during the 2014-16 surveys only;
- All wader species; and
- All tern and skua species.

⁴⁸ SNH (2017)³³ for the 2018 Baseline Ornithology Surveys, and previous versions of this guidance for the 2014-16 Baseline Ornithology Surveys

Secondary species included the following: all gull species; buzzard (*Buteo buteo*), sparrowhawk (*Accipiter nisus*) and raven (*Corvus corax*). In 2018 mallard and kestrel were also recorded as secondary species (while during the 2014-16 both were recorded as target species).

Vantage Point Locations

Three VP locations were used during all Flight Activity Surveys, as detailed in Figure 8.2 and 8.3. The locations used in 2014-16 differed slightly (by approximately 50-100 m) from those used in 2018⁴⁹; however, viewsheds were broadly similar and the results are considered comparable. VP co-ordinates are shown in Table 8.3.

Table 8.3: Co-ordinates of VP locations used for Flight Activity Surveys

| VP number | Survey period | X co-ordinate | Y co-ordinate |
|-----------|---------------|---------------|---------------|
| VP 1 | 2014-16 | 290900 | 961541 |
| | 2018 | 290940 | 961565 |
| VP 2 | 2014-16 | 290874 | 964295 |
| | 2018 | 290792 | 964279 |
| VP 3 | 2014-16 | 292421 | 961941 |
| | 2018 | 292421 | 961941 |

VP locations and revised VP viewsheds based on the RSH of the candidate turbine model are shown in Figures 8.2 (2014-16) and 8.3 (2018). Although there are some gaps in coverage based on the revised viewsheds, the band of airspace within the RSH of the candidate model that is not visible is expected to be very narrow (approximately 6 m⁵⁰). As such, while it is acknowledged that there may have been some undetected flight activity at PCH in this gap if flights were within this narrow height band, it is considered unlikely that there would have been significant levels of undetected flight activity at PCH. This is because any flight lines that were only partly within the gap, or that involved birds increasing their flight height to ≥ 20 m for part of the flight, would have been partly visible. Furthermore, based on the size of the coverage gap and lack of significant habitat features (such as waterbodies) within it, the range of target species likely to be flying at low heights within the gap is likely to be limited to certain foraging raptor species (hen harrier, short-eared owl and merlin) and potentially some breeding or foraging waders.

Survey Effort

The following minimum survey effort was completed during each complete season surveyed:

- Breeding season (April to August inclusive): 48 hours per VP⁵¹; and
- Non-breeding season (September to March inclusive, 2014-15 & 2015-16): 42 hours per VP.

This exceeds the minimum of 36 hours of survey effort per VP during each season recommended in NatureScot guidance⁴⁸ and resulted in a total survey effort of 258 hours per VP across all survey periods. A breakdown of monthly Flight Activity Survey effort

⁴⁹ Note that the VP 3 location was considered to be the same in both periods; although Avian Ecology reported slightly different co-ordinates (292449, 961847), it was considered likely that these were incorrect, due to the poor view afforded from this location

⁵⁰ It is not known what height RPS used to determine their viewsheds, but based on the lowest height band used by RPS during Flight Activity Surveys (0 to <20 m), which is assumed to be below the expected RSH at that time, it is considered likely that the viewsheds were based on the visible area from 20 m.

⁵¹ Note that the 2018 breeding season surveys included additional survey effort in early spring (February and March), with a total of 72 hours of survey per VP completed across the full period (February to August inclusive).

during each survey year is provided in Table 8.4. Full details of survey dates, times and weather conditions are presented in Tables A8.3.1, A8.3.7 and A8.3.13, Appendix A8.3.

Table 8.4: Summary of Flight Activity Survey Effort

| Period | Month | 2014-15 | | | 2015-16 | | | 2018 | | |
|---|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| | | VP 1 | VP 2 | VP 3 | VP 1 | VP 2 | VP 3 | VP 1 | VP 2 | VP 3 |
| Non-breeding season/early spring | Sep | 6 | 6 | 6 | 6 | 6 | 6 | N/A | N/A | N/A |
| | Oct | 6 | 6 | 6 | 6 | 6 | 6 | N/A | N/A | N/A |
| | Nov | 6 | 6 | 6 | 6 | 6 | 6 | N/A | N/A | N/A |
| | Dec* | 0 | 0 | 0 | 6 | 6 | 6 | N/A | N/A | N/A |
| | Jan | 12 | 12 | 12 | 6 | 6 | 6 | N/A | N/A | N/A |
| | Feb | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| | Mar | 6 | 6 | 6 | 6 | 6 | 6 | 18 | 18 | 0 |
| | Total | 42 | 42 | 42 | 42 | 42 | 42 | 24 | 24 | 6 |
| Breeding season | Apr | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 18 |
| | May | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| | Jun | 12 | 12 | 12 | 12 | 12 | 12 | 15 | 9 | 9 |
| | Jul | 12 | 12 | 12 | 12 | 12 | 12 | 9 | 15 | 21 |
| | Aug | 12 | 12 | 12 | 6 | 6 | 6 | 6 | 6 | 6 |
| | Total | 54 | 54 | 54 | 48 | 48 | 48 | 48 | 48 | 66 |
| | *Due to poor weather conditions in December 2014, Flight Activity Surveys scheduled for that month were postponed to January 2015 | | | | | | | | | |

8.3.6.2 Moorland Breeding Bird Surveys

A Moorland Breeding Bird Survey was completed in 2014, 2015 and 2018 to identify upland breeding wader territories. In all years, the Survey Area comprised open habitats within the Core Study Area and a 500 m Buffer Area and, in line with NatureScot guidance⁴⁸, surveys followed a modified version of the Brown and Shepherd (1993) method for surveying upland waders⁵².

Four survey visits were completed, at least seven days apart and in suitable weather conditions, between April and July (one visit per month). Although the survey targeted breeding waders, all bird species seen or heard were recorded on large scale maps using standard British Trust for Ornithology (BTO) species codes, and Common Birds Census (CBC) symbology⁵³ to denote behaviour.

Full details of survey dates, times and weather conditions are presented in Tables A8.3.2, A8.3.8 and A8.3.14, Appendix A8.3.

8.3.6.3 Breeding Raptor Surveys

Breeding Raptor Surveys were completed in 2014, 2015 and 2018, with the aim of identifying any breeding raptor (including owl) territories, particularly species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)⁷ and/or Annex I of the Birds Directive³. Surveys were completed with reference to species-specific raptor

⁵² Brown, A.F. and Shepherd, K.B. (1993) A method for censusing upland breeding waders. *Bird Study* 40, 189-195.

⁵³ Marchant, J. (1983) *Common Birds Census Instructions*. British Trust for Ornithology, Thetford.

survey methods current at the time⁵⁴, which involved a combination of walkover surveys and watches from suitable VP locations.

Survey visits were completed monthly between April and August (inclusive) in 2014 and 2015, and between February and August (inclusive) in 2018. The Survey Area comprised suitable habitat (including moorland, heathland, crags, cliffs, steep-sided burns, forest edge, stands of older trees within forest habitat, farm outhouses and derelict buildings) within the Core Study Area and a surrounding 2 km Buffer Area. In 2018, the Buffer Area was extended to 6 km for eagle species.

Target species included osprey (*Pandion haliaetus*), golden eagle, hen harrier (*Circus cyaneus*), white-tailed eagle (*Haliaeetus albicilla*), barn owl (*Tyto alba*), short-eared owl (*Asio flammeus*), merlin and peregrine (*Falco peregrinus*). During the 2014 and 2015 surveys, 'secondary' raptor species such as sparrowhawk, buzzard and kestrel were also recorded, along with observations of raven.

Full details of survey dates, times and weather conditions are presented in Tables A8.3.3, A8.3.9 and A8.3.15, Appendix A8.3.

8.3.6.4 Breeding Diver Surveys

Breeding Diver Surveys were completed in 2014, 2015 and 2018, with the aim of identifying any breeding red-throated diver or black-throated diver territories within 2 km of the Core Study Area and 2 km Buffer Area. Surveys were based on the methods described in Gilbert *et al.* (1998) and involved checking lochs for diver activity and signs of breeding.

In 2014 and 2015 monthly survey visits were completed between May and August (inclusive), while in 2018 surveys were completed between June and August (inclusive). Full details of survey dates, times and weather conditions are presented in Tables A8.3.4, A8.3.10 and A8.3.16, Appendix A8.3.

8.3.6.5 Focal Loch Watches

Focal Loch Watches were completed in 2014, 2015 and 2018 to record incoming and outgoing diver flights. Surveys were based on NatureScot guidance that was current at the time⁴⁸ and used the same recording method as the Flight Activity Surveys (detailed in Section 8.3.6.1). The VP locations are shown in Figure 8.5.6, Appendix A8.5.

Surveys were completed across a range of times (including dawn and dusk) in June and July 2014 (57 hours in total), July and August 2015 (110.5 hours in total) and August 2018 (24 hours in total).

Full details of survey dates, times and weather conditions are presented in Tables A8.3.5, A8.3.11 and A8.3.17, Appendix A8.3. Details of the Survey Area are presented in Appendix A8.4.

8.3.6.6 Winter Bird Surveys

Winter Bird Surveys were carried out in 2014-15 and 2015-16, with the aim of recording wintering moorland birds such as raptors and waders. In addition, locations and activity of foraging geese and swans, particularly designated features of the Caithness Lochs SPA, were also recorded. Surveys involved a combination of walkovers and short, ad-hoc watches from suitable VP locations. The Survey Area covered all areas of open moorland habitat within the Core Study Area and 500 m Buffer Area, with surveyors aiming to approach all parts of the Survey Area to within 200 m.

⁵⁴ Namely Hardey *et al.* (2013)²⁷³³ for the 2018 Baseline Ornithology Surveys, and previous editions of this publication for the 2014-16 Baseline Ornithology Surveys.

Three survey visits were completed during each non-breeding season (November, January and February in 2014-15; and October, December and February in 2015-16).

Full details of survey dates, times and weather conditions are presented in Tables A8.3.6 and A8.3.12, Appendix A8.3.

8.3.7 Collision Risk Modelling Methods

The Collision Risk Modelling (CRM) methods were based on the standard Band *et al.* (2007)¹⁹ Collision Risk Model. Data collected during the 2015-16 and 2018 Flight Activity Surveys were used to predict the number of individuals, per species, expected to collide with the turbine rotors.

Note that the 2014-15 Flight Activity Survey data was not included in the CRM because these records are more than five years old and therefore no longer considered valid to inform a robust assessment. The only exception to this was red-throated diver, because a clear flight path across the Site was identified in 2014, but was not used in 2015 or 2018. However, based on the species breeding ecology, it is possible that this flight path could be used in subsequent years. Therefore, as a precaution, CRM was completed based on the 2014 data to allow an assessment of potential collision risk if use of the flight path is resumed in future.

For the 2015-16 Flight Activity Surveys, height bands 1-4 (0-150 m) fall either entirely or partly within the RSH (13.9-149.9 m), while for the 2018 Flight Activity Surveys height bands 1 and 2 (0-150 m) fall either entirely or partly within the RSH. Therefore, a 'worst-case scenario' approach was adopted and all target species flights within these height bands that passed within the CRZ at PCH and included in the CRM (where sufficient flight activity was recorded⁵⁵).

CRM was completed separately for particular seasons (breeding and non-breeding), with the estimate based on the observed occupancy rate and the number of potentially active minutes in that period⁵⁶. Seasons were defined in accordance with NatureScot guidance on species-breeding seasons⁵⁷. The only exception was the 2018 red-throated diver breeding season, which was defined as April to August inclusive (rather than April to mid-September inclusive as defined in NatureScot guidance⁵⁷). This was because the 2018 surveys ended in August.

In addition, as flight activity by wildfowl and wader species is likely to include some nocturnal flights, for these species, 25% of nocturnal hours was added to the available daylight hours. This increased the total time period when birds could potentially be flying, thus allowing a precautionary approach for the CRM calculations.

⁵⁵ Generally defined as ≥ 3 flights or ≥ 10 individuals within the CRZ at PCH. Exceptions were red-throated diver (2015 and 2018 breeding seasons), white-tailed eagle (2018 breeding season); golden plover (2015 breeding season) and peregrine (2015-16); although flight activity for these species/periods was below the specified threshold, CRM was completed, either to allow mean breeding season flight activity to be estimated across years (peregrine, golden plover and red-throated diver) or high sensitivity of the species (white-tailed eagle).

⁵⁶ Note that certain species (e.g. osprey) are summer visitors and therefore only present during the breeding seasons. Several additional species (e.g. golden plover) could theoretically be present during the 2015-16 non-breeding season but were only recorded during the breeding season. For these species, since flights were only recorded during the breeding season in 2015-16, the seasonal (breeding season) collision risk equates to annual risk. As the associated CRM was based on survey effort during the breeding season only (and excluded additional survey hours during the non-breeding season when no birds were recorded), this is likely to result in a slightly higher, and therefore more conservative, annual collision risk than if non-breeding season survey effort was included.

⁵⁷ SNH (2009) Breeding season dates for key breeding species in Scotland [Online] Available at: <https://www.nature.scot/bird-breeding-season-dates-scotland> (Accessed 27/08/20)

A summary of target species selection for inclusion in the CRM is presented in Table 8.5. For brevity, shelduck (*Tadorna tadorna*), mallard, grey heron and kestrel are not included because, although these species were recorded as target species in one or more survey years, they are not a designated feature of any statutory sites or listed in NatureScot guidance³⁴ as a priority species for assessment, and are considered to of relatively low conservation concern (i.e. not included on Schedule 1⁷, Annex I³ or the UK BoCC Red list²³). None of these species were recorded in unusually high numbers and it is considered highly unlikely that the Development will have an adverse effect on the conservation status of regional populations of these species.

Table 8.5: Summary of Target Species Selection for CRM

| Species* | | Survey year/season** | Total flights in CRZ at PCH | | CRM carried out? | Justification (where CRM was not carried out) |
|-----------------------------------|-----------------------------|--|--|-------------|------------------|--|
| English (British) vernacular name | Scientific name | | Flights | Individuals | | |
| Greylag goose | <i>Anser anser</i> | 2015-16: non-breeding season | 1 | 8 | Yes | N/A |
| | | 2015: breeding season | 7 | 33 | Yes | N/A |
| | | 2018: breeding season | 14 | 60 | Yes | N/A |
| Pink-footed goose | <i>Anser brachyrhynchus</i> | 2015-16: non-breeding season | 1 | 11 | No | Not a designated feature of any SPAs or Ramsar sites within 20 km, therefore, in accordance with NatureScot guidance, CRM not required ⁵⁸ |
| | | 2015: breeding season | 8 | 355 | | |
| | | 2018: breeding season | 4 | 70 | | |
| Whooper swan | <i>Cygnus cygnus</i> | 2015-16: non-breeding and breeding seasons | No flights recorded during these periods | | No | No flight activity |
| | | 2018: breeding season | | | | |
| Teal | <i>Anas crecca</i> | 2015-16: non-breeding season | No flights recorded during these periods | | No | No flight activity |
| | | 2015: breeding season | | | | |
| | | 2018: breeding season | 1 | 1 | No | Insufficient flight activity |
| Goldeneye | <i>Bucephala clangula</i> | 2015-16: non-breeding season | 1 | 1 | No | Insufficient flight activity |
| | | 2015: breeding season | No flights recorded during these periods | | No | No flight activity |
| | | 2018: breeding season | | | | |
| Red-throated diver | <i>Gavia stellata</i> | 2014: breeding season | 6 | 8 | Yes | N/A |
| | | 2015: breeding season | 1 | 2 | No | Insufficient flight activity |

⁵⁸ SNH (2020) Wind Farm Impacts on Birds [Online] Available at: <https://www.nature.scot/professional-advice/planning-and-development/advice-planners-and-developers/renewable-energy-development/onshore-wind-energy/wind-farm-impacts-birds> (Accessed 27/08/20)

| Species* | | Survey year/season** | Total flights in CRZ at PCH | | CRM carried out? | Justification (where CRM was not carried out) |
|-----------------------------------|------------------------------|------------------------------|--|-------------|------------------|---|
| English (British) vernacular name | Scientific name | | Flights | Individuals | | |
| | | 2018: breeding season | 2 | 3 | Yes | N/A |
| Black-throated diver | <i>Gavia arctica</i> | 2015: breeding season | 1 | 1 | No | Insufficient flight activity |
| | | 2018: breeding season | No flights recorded during this period | | No | No flight activity |
| Osprey | <i>Pandion haliaetus</i> | 2015: breeding season | 3 | 3 | Yes | N/A |
| | | 2018: breeding season | 3 | 3 | Yes | N/A |
| Golden eagle | <i>Aquila chrysaetos</i> | 2015-16: non-breeding season | 1 | 1 | No | Insufficient flight activity |
| | | 2015: breeding season | No flights recorded during this period | | No | No flight activity |
| | | 2018: breeding season | 1 | 1 | No | Insufficient flight activity |
| Hen harrier | <i>Circus cyaneus</i> | 2015-16: non-breeding season | 3 | 3 | Yes | N/A |
| | | 2015: breeding season | 3 | 3 | Yes | N/A |
| | | 2018: breeding season | 7 | 8 | Yes | N/A |
| White-tailed eagle | <i>Haliaeetus albicilla</i> | 2015-16: non-breeding season | No flights recorded during these periods | | No | No flight activity |
| | | 2015: breeding season | | | | |
| | | 2018: breeding season | 2 | 2 | Yes | N/A |
| Oystercatcher | <i>Haematopus ostralegus</i> | 2015-16: non-breeding season | No flights recorded during these periods | | No | No flight activity |
| | | 2015: breeding season | | | | |
| | | 2018: breeding season | 2 | 3 | No | Insufficient flight activity |
| Lapwing | <i>Vanellus vanellus</i> | 2015-16: non-breeding season | No flights recorded during this period | | No | No flight activity |
| | | 2015: breeding season | 4 | 7 | Yes | N/A |

| Species* | | Survey year/season** | Total flights in CRZ at PCH | | CRM carried out? | Justification (where CRM was not carried out) |
|-----------------------------------|----------------------------|------------------------------|--|-------------|------------------|---|
| English (British) vernacular name | Scientific name | | Flights | Individuals | | |
| | | 2018: breeding season | 11 | 13 | Yes | N/A |
| Golden plover | <i>Pluvialis apricaria</i> | 2015-16: non-breeding season | No flights recorded during this period | | No | No flight activity |
| | | 2015: breeding season | 2 | 2 | Yes | N/A |
| | | 2018: breeding season | 1 | 23 | Yes | N/A |
| Curlew | <i>Numenius arquata</i> | 2015-16: non-breeding season | No flights recorded during this period | | No | No flight activity |
| | | 2015: breeding season | 33 | 41 | Yes | N/A |
| | | 2018: breeding season | 16 | 17 | Yes | N/A |
| Dunlin | <i>Calidris alpina</i> | 2015: breeding season | 2 | 2 | No | Insufficient flight activity |
| | | 2018: breeding season | No flights recorded during this period | | No | No flight activity |
| Snipe | <i>Gallinago gallinago</i> | 2015-16: non-breeding season | No flights recorded during this period | | No | No flight activity |
| | | 2015: breeding season | 12 | 17 | Yes | N/A |
| | | 2018: breeding season | 5 | 5 | Yes | N/A |
| Common sandpiper | <i>Actitis hypoleucos</i> | 2015: breeding season | No flights recorded during this period | | No | No flight activity |
| | | 2018: breeding season | 1 | 2 | No | Insufficient flight activity |
| Greenshank | <i>Tringa nebularia</i> | 2015: breeding season | 1 | 1 | No | Insufficient flight activity |
| | | 2018: breeding season | 1 | 1 | No | Insufficient flight activity |
| Arctic tern | <i>Sterna paradisaea</i> | 2015: breeding season | No flights recorded during this period | | No | No flight activity |
| | | 2018: breeding season | 63 | 95 | Yes | N/A |
| Great skua | <i>Stercorarius skua</i> | 2015: breeding season | No flights recorded during this period | | No | No flight activity |
| | | 2018: breeding season | 1 | 1 | No | Insufficient flight activity |

| Species* | | Survey year/season** | Total flights in CRZ at PCH | | CRM carried out? | Justification (where CRM was not carried out) |
|-----------------------------------|--------------------------|--|--|-------------|------------------|---|
| English (British) vernacular name | Scientific name | | Flights | Individuals | | |
| Short-eared owl | <i>Asio flammeus</i> | 2015-16: non-breeding and breeding seasons | No flights recorded during these periods | | No | No flight activity |
| | | 2018: breeding season | | | | |
| Merlin | <i>Falco columbarius</i> | 2015-16: non-breeding season | No flights recorded during this period | | No | No flight activity |
| | | 2015: breeding season | 3 | 4 | Yes | N/A |
| | | 2018: breeding season | 4 | 5 | Yes | N/A |
| Peregrine | <i>Falco peregrinus</i> | 2015-16: non-breeding season | No flights recorded during this period | | No | No flight activity |
| | | 2015: breeding season | 2 | 2 | Yes | N/A |
| | | 2018: breeding season | 5 | 7 | Yes | N/A |

*Species names and order in which they are listed follow the British List maintained by the BOU¹

**For brevity, where a species is not typically present during the non-breeding season (and was not recorded), only breeding seasons are included. Species-specific breeding seasons were defined according to NatureScot guidance⁵⁷

Flight lines of target species for which CRM was completed are shown in Figures 8.4.1-8.4.17 of Appendix A8.4, and Figures 8.5.7, 8.5.11 and 8.5.13-8.5.16 of Appendix A8.5.

For each species, the risk of collision for an individual was calculated by estimating the likelihood of collision based on the characteristics of the birds and of the turbines. The Band *et al.* (2007)¹⁹ model runs as a two-stage process:

- **Stage 1:** calculate the number of birds flying through the rotors; and
- **Stage 2:** estimate the probability of a bird flying through the rotors being hit.

The estimated numbers of bird movements through the CRZ at PCH (stage 1) is then multiplied by the probability of collision (stage 2) to estimate the theoretical number of birds at risk of collision.

This produces a theoretical collision mortality rate that assumes birds take no action to avoid collision when, in practice, most birds do take avoiding action³⁰, which dramatically lowers predicted mortality¹⁹. Therefore, the predicted collision mortality is combined with a parameter representing avoidance behaviour likely to be displayed by birds flying towards turbine blades. This involves the use of species-specific avoidance rates recommended by NatureScot⁵⁹.

For species that usually fly in approximately straight lines in a particular direction, a 'directional' model type was used. This type of model was used for greylag goose flights recorded during 2015-16, red-throated diver flights recorded during all survey years and Arctic tern during 2018. For species that generally fly in an irregular pattern, a 'random' model type was used. This type of model was used for all other species modelled.

Details of the input data and CRM calculations are provided in Appendix A8.4.

8.3.8 Methodology for the Assessment of Effects

The significance of the potential effects of the Development has been classified by professional consideration of the sensitivity of the receptor and the magnitude of the potential effect.

The approach used for the Ecological Impact Assessment (EcIA) process is in line with guidance produced by CIEEM²¹ and NatureScot³⁶, and comprises the following stages:

- Evaluation of the importance of ornithological features through Desk Study and Baseline Ornithology Surveys – those considered to be IOFs are scoped into the assessment, while species considered to be of local importance are scoped out;
- Identification and characterisation of potential effects on IOFs;
- Assessment of potential effects on IOFs, both from the Development alone and in combination with other developments in the surrounding area (cumulative effects);
- Identification of any measures required to avoid and mitigate (reduce) these effects; and
- Assessment of the significance of any residual effects after mitigation.

Further details relating to the methods used for evaluating the importance of ornithological features, characterising potential impacts, and assessing the significance of residual effects are provided below.

8.3.8.1 Sensitivity of Receptors

The sensitivity of the baseline conditions, including the importance of environmental features on or near to the Site or the sensitivity of potentially affected IOFs, is assessed

⁵⁹ SNH (2018) Avoidance Rates for the onshore SNH Wind Farm Collision Risk Model [Online] Available at: <https://www.nature.scot/wind-farm-impacts-birds-use-avoidance-rates-snh-wind-farm-collision-risk-model> (Accessed 27/08/20)

in line with best practice guidance, legislation, statutory designations and / or professional judgement.

Ornithological features can be important for a variety of reasons, and may relate, for example, to species rarity, the extent to which they are threatened throughout their range, or to their rate of decline.

The level of importance of ornithological features identified during the Desk Study and Baseline Ornithology Surveys has been determined using the criteria defined in Table 8.6. These criteria have been determined with reference to CIEEM guidance²¹, and include a consideration of relevant legislation, conservation status, population size and distribution, level of Site use and, where not a designated feature of an SPA or Ramsar site (with potential connectivity to the Site), whether the species identified in NatureScot guidance³⁴ as a priority for assessment when considering the development of onshore wind farms in Scotland.

Note that, in some cases, information relating to the size (and distribution) of local and regional populations can be limited or unavailable. Where this is the case and it is not clear whether a population is present in locally versus regionally (or regionally versus nationally) important numbers, a precautionary approach is used and the population is assessed as being of the higher level of importance.

Table 8.6: Criteria for Evaluation of Importance of Ornithological Features

| Importance level | Examples |
|---------------------|--|
| International | <ul style="list-style-type: none"> • The regular presence within or around the Site of a cited interest of an existing or proposed statutory site of international ornithological importance, i.e. SPA or Ramsar site, with potential connectivity to the Site. Cited means mentioned in the citation text for the protected site as a species for which the site is designated. • The regular presence within or around the Site of other bird species that contribute to the integrity of an existing or proposed SPA or Ramsar site (such as part of an assemblage where this is a designated feature), where there is potential connectivity with the Site. |
| National (Scotland) | <ul style="list-style-type: none"> • The regular presence within or around the Site of a species listed on Annex I of the Birds Directive, where the species is not a cited interest of a statutory site of international ornithological importance but is present in nationally important numbers. • The regular presence within or around the Site of a breeding species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), where the species is not a cited interest of a statutory site of international ornithological importance but is present in nationally important numbers. • The regular presence within or around the Site of nationally important numbers of a species of conservation concern⁶⁰, where this is identified in NatureScot guidance³⁴ as a priority for assessment. • The regular presence within or around the Site of nationally important numbers of a migratory species which is either rare or vulnerable, or warrants special consideration on account of the proximity of migration routes, or breeding, moulting, wintering or staging areas in relation to a proposed development, and which is identified in NatureScot guidance³⁴ as a priority for assessment. |

⁶⁰ An SBL priority species or Red/Amber-listed BoCC

| Importance level | Examples |
|------------------|---|
| Regional (NHZ) | <ul style="list-style-type: none"> • A cited interest of an existing or proposed SPA or Ramsar site, with potential connectivity to the Site, which is present within or around the Site infrequently or in low numbers, but could use Site more regularly post-construction. • Other bird species that contribute to the integrity of an existing or proposed SPA or Ramsar site, with potential connectivity to the Site, which is present within or around the Site infrequently or in low numbers, but could use the Site more regularly post-construction. • Other species listed on Annex I of the Birds Directive, or breeding species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), that are present within or around the Site infrequently or in low numbers (regionally or locally important numbers), but could use the Site more regularly post-construction. • A regionally (i.e. at the NHZ scale) important population/assemblage of a species of conservation concern⁶⁰ that regularly occurs within or around the Site, where this is identified in NatureScot guidance³⁴ as a priority for assessment. |
| Local | <ul style="list-style-type: none"> • A cited interest of an existing or proposed SPA or Ramsar site, with potential connectivity to the Site, but which is present within or around the Site infrequently or in low numbers, and Site use is not expected to increase significantly post-construction. • Other bird species that contribute to the integrity of an existing or proposed SPA or Ramsar, with potential connectivity to the Site, but which are present within or around the Site infrequently or in low numbers, and Site use is not expected to increase significantly post-construction. • Other species listed on Annex I of the Birds Directive, or breeding species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), that are present within or around the Site infrequently or in low numbers, and Site use is not expected to increase significantly post-construction • Other species identified in NatureScot guidance³⁴ as a priority for assessment, but which are present within or around the Site infrequently or in low numbers, and Site use is not expected to increase significantly post-construction. • A locally important population/assemblage of a species of conservation concern⁶⁰ that regularly occurs within or around the Site, but is not identified in NatureScot guidance³⁴ as a priority for assessment and is unlikely to be at significant risk of impact from the Development. |
| Less than Local | <ul style="list-style-type: none"> • All other species that are widespread and common and of low conservation concern (e.g. included on the UK BoCC Green-list²³) and which are not present in locally important (or greater) numbers. |

8.3.8.2 Characterisation of Potential Effects

In line with the CIEEM EcIA guidance²¹ where possible, consideration is given to the following characteristics when identifying potential effects of the Development on ornithological features:

- Nature of effect: whether it is positive (beneficial) to ornithological features, e.g. by increasing species diversity or extending habitat, or negative (detrimental), e.g. by loss of, or displacement from, suitable habitat;
- Extent: the spatial or geographical area over which the effect may occur;
- Magnitude: the size, amount, intensity, and volume of the effect;
- Duration: the duration of an effect as defined in relation to ornithological characteristics (such as a species' life cycle) as well as human timeframes. It should also be noted that the duration of an activity may differ from the duration of the resulting effect; e.g. if short-term construction activities cause disturbance to

breeding birds, there may be long-term implications from failure to reproduce that season;

- Frequency: the number of times an activity occurs may influence the resulting effect; and
- Timing: this may result in an impact on an ecological feature if it coincides with critical life stages or seasons (e.g. the breeding season).

The criteria for assessing the magnitude of a potential effect are defined as follows:

- High: A fundamental change to the baseline condition of the IOF, leading to total loss or major alteration of the relevant population;
- Medium: A material change to the baseline condition of the IOF, leading to partial loss or alteration of the relevant population;
- Low: A slight, detectable, alteration of the baseline condition of the IOF; and
- Negligible: A barely distinguishable change from baseline conditions.

It is considered that a magnitude level of medium or higher could potentially have a significant effect on a LSE.

8.3.8.3 Significance of Effects

The latest CIEEM EcIA guidance²¹ avoids and discourages use of the matrix approach to determining significance, and describes only two categories: 'significant' or 'not significant'.

According to the CIEEM guidance, for the purpose of EcIA, a 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for important ecological features or for biodiversity in general.

NatureScot guidance (2018a)³⁴ refers to maintaining the favourable the conservation status of a bird species (or not affecting its recovery) when assessing the significance of any wind farm impact. Conservation status is defined in this guidance as "*the sum of the influences acting on it which may affect its long-term distribution and abundance, within the geographical area of interest (which for the purposes of the Birds Directive is the EU)*". Conservation status is considered to be "favourable" under the following circumstances:

- "population dynamics indicate that the species is maintaining itself on a long-term basis as a viable component of its habitats;
- the natural range of the species is not being reduced, nor is likely to be reduced for the foreseeable future; and
- there is (and probably will continue to be) a sufficiently large habitat to maintain its population on a long-term basis".

Effects can be considered significant at a wide range of scales from international to local. NatureScot³⁴ recommends 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. An adverse impact on a species at a regional scale (within Scotland) may adversely affect its national conservation status*". Thus, "*An impact should therefore be judged as of concern where it would adversely affect the existing favourable conservation status of a species or prevent a species from recovering to favourable conservation status, in Scotland*."

Where potential connectivity with a SPA or Ramsar site has been identified, significant effects on species are assessed in the context of potential effects on the conservation status of that particular SPA or Ramsar site population, as this is considered to be the most appropriate scale for assessment. In the case of species that are not designated features of statutory sites, the relevant scale for assessment of significant effects on conservation status of breeding populations is considered to be the appropriate NHZ. The

Site is located within NHZ 5 (Peatlands of Caithness and Sutherland). For wintering or migratory species that are not designated features of statutory sites, there is limited information on NHZ populations; in this situation effects on the conservation status of the Scottish population have been considered when determining whether potential effects are likely to be significant.

In this assessment, any effect that could threaten the integrity of a statutory site designated for ornithological features or the favourable conservation status of a population is considered to be significant. Where this is not the case, effects are considered to be not significant.

8.3.9 Assessment Limitations

8.3.9.1 Non-breeding Dataset

Data obtained during the first year of Baseline Ornithology Surveys completed in 2014-15 are more than five years old, and were therefore not considered to be valid for inclusion in the assessment. As such the assessment is based on two years of breeding season data (2015 and 2018) but only one year of non-breeding bird survey data (2015-16). However, levels of breeding activity recorded during 2015-16 (as well as the preceding year) were very low, and it is considered unlikely that surveys covering a second non-breeding season would have yielded significantly different results. Furthermore, as noted in Section 8.3.1.2, NatureScot confirmed that this omission was not critical because the bird interest at most nearby statutory sites (including the Caithness and Sutherland Peatlands SPA/Ramsar site and component SSSIs) is for breeding species. As such, whilst this limitation is acknowledged, it is not considered to undermine the robustness of the assessment.

8.3.9.2 Cumulative Assessment

As different projects often employ different baseline survey and impact assessment methods, data often cannot be directly compared, and so quantitative assessment of cumulative effects is often not possible. Furthermore, as there is no compulsion for developers to share commercial data with other companies, it is often impossible to acquire a full dataset. Therefore, a comprehensive and quantitative cumulative impact assessment is rarely possible. However, every effort has been made to provide a qualitative assessment that is as robust as the available data allows.

8.3.10 Embedded Mitigation

In accordance with CIEEM guidance²¹, a sequential process has been adopted to avoid, mitigate and compensate negative effects (often referred to as the 'mitigation hierarchy') on IOFs. In addition, opportunities for enhancements that will benefit IOFs have been identified where possible. There are three key types of embedded mitigation with relevance to ornithological features:

1. Designing the Development layout with consideration to ornithological constraints (described in Appendix A8.5), as detailed in **Chapter 3: Site and Design**;
2. Restoration of peatland habitats, as outlined in **Chapter 7: Ecology**; and
3. Implementation of a Bird Protection Plan (BPP), as detailed below, to protect breeding birds.

Subsequent sections of this Chapter assume that the embedded mitigation described below will be fully implemented.

8.3.10.1 Bird Protection Plan

Under the Wildlife and Countryside Act 1981 (as amended) it is an offence to kill or injure any bird, or to damage or destroy nests and eggs. Breeding Schedule 1 species identified

during the Baseline Ornithology Surveys and/or Desk Study are detailed in Appendix A8.5. It is possible that additional Schedule 1 species could breed on or near the Site in future.

In addition, although no roosting raptors were recorded during the Baseline Ornithology Surveys, it is possible that hen harrier could roost on or near the Site in future, including during the non-breeding season. Hen harrier is listed on Schedule 1A of the Act, which protects it from harassment at all times (including the non-breeding season). It is also possible that short-eared owl and/or merlin, which are listed on Schedule 1 of the Act and/or Annex I of the Birds Directive could roost on or near the Site in future, particularly during the non-breeding season. As such, it is proposed that potential disturbance to any roosting short-eared owl or merlin listed is minimised as part of the good practice measures outlined below.

It is proposed that the measures outlined below are incorporated into a detailed BPP to ensure that all breeding birds, and the roosting raptor species listed above, are protected during all phases of the Development. To ensure that mitigation measures are reactive to changing conditions on Site and compliance with legislation protecting breeding birds, it is recommended that a suitably experienced and qualified Ecological Clerk of Works (ECoW) attends Site regularly to make observations of birds present in and around areas where works are planned, and identify any potential constraints to Development works.

Construction Phase

Timing of works: Where possible, construction works (including felling, if required) will take place outside the main breeding bird season (March to August inclusive).

Pre-construction survey for breeding crossbill species: Crossbill (*Loxia curvirostra*) has a protracted breeding season²⁵ and NatureScot have defined the breeding season for this species as January to mid-December, and February to mid-July for Scottish crossbill (*Loxia scotica*)⁵⁷. If any felling is required, precautions must be taken to avoid potential disturbance to nesting birds or destruction of active nests. A pre-construction survey of areas of suitable habitat for nesting crossbill species within 150 m of works will be completed ahead of any operations, regardless of the time of year, by a suitably experienced and qualified ECoW, to check for evidence of breeding or active nests.

Pre-construction survey for other breeding birds: Where construction works are required during the breeding bird season, the area within 500 m of works should be surveyed ahead of any operations, by a suitably experienced and qualified ECoW, to check for active nests of all bird species (excluding crossbill species, which are covered above). Where there is suitable habitat for nesting Schedule 1 species, the survey area will be extended to the maximum buffer distance for the relevant species recommended in Ruddock & Whitfield (2007)²⁸.

Toolbox talk: A 'toolbox talk' will be delivered by a suitably experienced ECoW to ensure that all contractors working on the Development are aware of ornithological sensitivities and relevant legislation.

Protection of nesting birds: If any nests (or breeding territories of Schedule 1 species) are identified during pre-construction surveys, an exclusion zone around the nest will be established (with the distance appropriate to the species and agreed through consultation with NatureScot). No works will be permitted within exclusion zone and no personnel or vehicles will be allowed to enter or pass through until the ECoW has confirmed that the chicks have fledged or the breeding attempt has failed.

Where this is not feasible, NatureScot will be contacted and further mitigation measures agreed to ensure that nesting birds are not disturbed. This could involve, for example, limiting the number of Site personnel accessing the relevant area to the minimum number required to complete the works, restricting working hours, and employment of an ECoW to undertake a watching brief.

Protection of roosting raptors: Although it is unlikely that standard construction activities could be construed as intentional harassment, there is a possibility that, if any roosting hen harriers are identified within the Site or surrounding area (at any time of year) and no measures are taken to protect them from disturbance, this could be considered to constitute reckless harassment. As such, it is proposed that the toolbox talk (see above) should include roosting hen harrier. Furthermore, it is proposed that roosting short-eared owl and merlin are included in the toolbox talk as a good practice measure.

In the unlikely event that any roosting hen harriers are identified, a specific protection plan will be developed to avoid or minimise potential effects to these species. Specific mitigation for hen harrier would be agreed with NatureScot but would likely include avoiding any works around the hours of dusk and dawn (or overnight), implementing an appropriate exclusion zone around the roost site within which works are restricted whilst birds are using the roost, and monitoring by a suitably experienced ECoW.

Minimising disturbance from Site vehicles: Where construction works are required during the breeding bird season, in order to minimise disturbance to any birds identified as breeding near access tracks, the number of vehicles accessing the Site via these roads should be limited to the minimum number required to complete the works effectively, and the number of vehicle movements along roads should be minimised as far as possible. Stops should be minimised and personnel should remain in their vehicles between work areas. In addition, a maximum speed limit of 15 mph should be adhered to in order to minimise noise disturbance (and aid dust suppression).

Operational Phase

Routine maintenance required during operation is expected to be minimal, involving only small areas and of a temporary duration. However, should significant operational works be required during the nesting bird season, or any Schedule 1 nesting birds or roosting raptors be observed, it is recommended that the mitigation measures outlined above for the construction phase are implemented to protect breeding birds and any roosting raptors.

Decommissioning Phase

As decommissioning works are likely to be of a similar nature and duration as construction activities, the mitigation outlined above for construction works should also be implemented during the decommissioning phase, in order to protect both nesting birds and any roosting raptors listed on Schedule 1 and/or Annex I.

8.4 BASELINE CONDITIONS

8.4.1 Desk Study

8.4.1.1 Statutory Sites

A number of statutory sites designated for ornithological features were identified within the relevant search areas; details are provided in Table 8.7 below.

Table 8.7: Summary of Statutory Sites Designated for Ornithological Interest

| Site name | Designation | Qualifying ornithological interests | Proximity to/direction from the Site Boundary* |
|--|-------------|--|--|
| Sites of European Importance | | | |
| Caithness and Sutherland Peatlands | SPA | <ul style="list-style-type: none"> Twelve breeding species: red-throated diver), black-throated diver, wigeon (<i>Mareca penelope</i>), common scoter, golden eagle, hen harrier (<i>Circus cyaneus</i>), golden plover (<i>Pluvialis apricaria</i>), dunlin (<i>Calidris alpina</i>), wood sandpiper (<i>Tringa glareola</i>), greenshank, short-eared owl and merlin. | Adjacent to south-east |
| | Ramsar site | <ul style="list-style-type: none"> Breeding dunlin, and possibly breeding greylag goose⁴⁴. Breeding bird assemblage. | |
| North Caithness Cliffs | SPA | <ul style="list-style-type: none"> Six breeding species: fulmar (<i>Fulmarus glacialis</i>), Kittiwake (<i>Rissa tridactyla</i>), common guillemot (<i>Uria aalge</i>), razorbill (<i>Alca torda</i>), puffin (<i>Fratercula arctica</i>) and peregrine, Breeding seabird assemblage. | 1.5 km to north |
| Caithness Lochs | SPA | <ul style="list-style-type: none"> Three non-breeding wildfowl species: Greenland white-fronted goose (<i>Anser albifrons flavirostris</i>), greylag goose and whooper swan (<i>Cygnus cygnus</i>). | 10.1 km to south-east |
| | Ramsar site | | |
| Sites of National Importance | | | |
| East Halladale** | SSSI | <ul style="list-style-type: none"> Two breeding species: golden plover and dunlin. Breeding bird assemblage***. | Adjacent to south-east |
| Red Point Coast**** | SSSI | <ul style="list-style-type: none"> Breeding common guillemot. | 1.5 km to north |
| West Halladale** | SSSI | <ul style="list-style-type: none"> Two breeding species: black-throated diver and common scoter. Breeding bird assemblage***. | 2.7 km to south-west |
| Lochan Buidhe Mires** | SSSI | <ul style="list-style-type: none"> Breeding bird assemblage***. | 8.9 km to west-southwest |
| *At the closest point; **Component of the Caithness and Sutherland Peatlands SPA; ***Considered to comprise birds included on the "upland moorland with water bodies" list ⁴² referenced by NatureScot (see Table 8.1); ****Component of the North Caithness Cliffs SPA | | | |

8.4.1.2 Existing Records of Protected Species

HRSR Records

The HRSR returned records of three breeding Schedule 1 raptor species within the relevant search areas. Further details are presented in Appendix A8.5.

RSPB Records

For reasons of brevity, only records from the most recent (2020) data request are summarised. Additional (2018) records of breeding eagles within 6 km and other breeding Schedule 1/Annex I species within 2 km of the Site are summarised in Appendix A8.5.

In 2020, the RSPB returned 31 records of 26 protected species and species of conservation concern within 2 km of the Site. This included historic breeding territories of one Schedule 1 species and one Annex I species, and single registrations of two further Schedule 1 species recorded during the breeding season (breeding status was stated as unknown, but based on habitat, it is considered unlikely that either species was breeding at the recorded location). Due to the potentially sensitive nature of these records, further details are included in Appendix A8.5.

With the exception of these four species and records of passerines, which did not include any breeding Schedule 1 species (and which are generally considered to be at low risk from wind farm developments³³), records of species of conservation are summarised in : 8.8.

Table 8.8 Summary of Records of Non-passerine Species of Conservation Concern (excluding sensitive records) within 2 km of the Site Received from the RSPB

| Species* | | Conservation listings** | No. of records | Recording year/ period | Notes |
|-----------------------------------|---------------------------------|---------------------------|----------------|------------------------|---|
| English (British) vernacular name | Scientific name | | | | |
| Pink-footed goose | <i>Anser brachyrhynchus</i> | Amber | 1 | 2012 | 83 individuals recorded on spring passage |
| Hen harrier | <i>Circus cyaneus</i> | Sch1 & 1A; AnnI; Red; SBL | 1 | 2012 | A single bird recorded in October |
| Ringed plover | <i>Charadrius hiaticula</i> | Red | 2 | 2012 | 13 recorded in March and 12 recorded in October |
| Woodcock | <i>Scolopax rusticola</i> | Red; SBL | 1 | 2012 | Single bird recorded in November |
| Common gull | <i>Larus canus</i> | Amber | 1 | 2016 | A single bird recorded in June |
| Arctic skua | <i>Stercorarius parasiticus</i> | Red; SBL | 1 | 2012 | A single individual recorded in early June; breeding status unknown |
| Turtle dove | <i>Streptopelia turtur</i> | Red; SBL | 1 | 2012 | Single bird recorded on spring passage in June |
| Cuckoo | <i>Cuculus canorus</i> | Red; SBL | 1 | 2012 | A singing/displaying male recorded in June |
| Tawny owl | <i>Strix aluco</i> | Amber | 1 | 2012 | Single individual recorded between June and August; breeding status unknown |
| Kestrel | <i>Falco tinnunculus</i> | Amber; SBL | 1 | 2012 | Single bird recorded in August; breeding status unknown |

| Species* | | Conservation listings** | No. of records | Recording year/period | Notes |
|---|-----------------|-------------------------|----------------|-----------------------|-------|
| English (British) vernacular name | Scientific name | | | | |
| * Species names and order in which they are listed follow the British List maintained by the BOU ¹ **Sch1 and Sch1A = species listed on Schedules 1 and 1A respectively of the Wildlife and Countryside Act 1981 (as amended); AnnI = species listed on Annex I of the Birds Directive; Red and Amber = species listed on the UK BoCC ²³ Red and Amber lists respectively; SBL = species listed on the SBL | | | | | |

In addition, the 2020 dataset included a single registration of a white-tailed eagle recorded in flight within 6 km of the Site (but more than 2 km away) in September 2019 and 1,384 records of common scoter (all of which were more than 2 km from the Site). Further details of the common scoter registrations are presented in Appendix A8.5.

NatureScot Records

NatureScot returned records of confirmed or potential breeding territories of three Schedule 1 species, some of which correspond with territories reported by the HRSG. In addition, NatureScot provided common scoter records within the Caithness and Sutherland Peatlands SPA and nearby areas from the last national census in 2007. In their response to the Drum Hollistan 2 application, NatureScot also made reference to a historic breeding territory of an additional Schedule 1 species.

Further details of all of these records are presented in Appendix A8.5.

BTO Records

The BTO returned five records of common scoter, all of which were recorded during the non-breeding season. A summary is presented in Table 8.9.

Table 8.9: Summary of Common Scoter Records within NC86 and NC96 Received from the BTO

| Date | No. of birds | Grid reference | Site | Dataset |
|------------|--------------|----------------|--------------|--------------------|
| 23/10/2018 | 1 | NC9565 | Sandside Bay | BirdTrack |
| 16/09/2013 | 2 | NC9665 | Sandside | BirdTrack |
| 31/01/2011 | Not recorded | NC86 | Not recorded | Bird Atlas 2007-11 |
| 31/01/2011 | Not recorded | NC96 | Not recorded | Bird Atlas 2007-11 |
| 20/10/2009 | 1 | NC96 | Sandside Bay | BirdTrack |

Additional Common Scoter Records

The Bighouse Estate advised that they did not hold any common scoter records. At the time of writing, no response to the request for any common scoter records had been received from Forsinard Flyfishers.

Information from the Drum Hollistan and Drum Hollistan 2 Wind Farms⁴⁷

The proposed Drum Hollistan Wind Farm⁶¹ borders the Site to the north-east. Baseline ornithology surveys for this development were completed between October 2014 and September 2016 to inform the Environmental Statement (ES), which was submitted in 2016. The surveys comprised of year-round Flight Activity Surveys, Moorland Breeding Bird Surveys, Breeding Diver Surveys, Breeding Raptor Surveys and Foraging Goose Surveys.

Following submission of the ES in 2016, NatureScot requested further surveys for breeding raptors, specifically hen harrier, merlin and short-eared owl, and an assessment of potential effects on the Caithness and Sutherland Peatlands SPA breeding populations of these species. This information was included as Supplementary Environmental Information (SEI), which was submitted in 2017. In addition, an updated greylag goose cumulative collision risk assessment and a response to the RSPBs consultation response was included as part of SEI submitted in June 2020⁶².

The Ornithology Chapter and Technical Appendix of the ES, together with the Ornithology Chapter of the SEI, were reviewed for any relevant ornithology records.

Following the subsequent refusal of the scheme, an application for a smaller development (comprising seven turbines rather than 17) was submitted as Drum Hollistan 2 Wind Farm in February 2020⁶³. The Ornithology Chapter of the EIA Report for this development was also reviewed, but as the ornithological impact assessment was based on the 2014-17 data, it did not include any additional information.

Key results are summarised below.

Flight Activity Surveys: target species recorded included eight qualifying interests of SPAs with potential connectivity to Drum Hollistan Wind Farm⁴⁷:

- Greylag goose: 39 flights in 2014-15 and 55 in 2015-16;
- Greenland white-fronted goose⁶⁴: two flights in 2014-15 and none in 2015-16;
- Whooper swan: one in 2014-15 and three in 2015-16;
- Red-throated diver: one flight in 2014-15 and none in 2015-16;
- Hen harrier: six flights in 2014-15 and four in 2015-16;
- Golden plover: one flight in 2014-15 and three in 2015-16;
- Merlin: two flights in 2014-15 and one in 2015-16; and
- Peregrine: four flights in 2014-15 and six in 2015-16.

Additional target species included pink-footed goose (21 flights in total).

Moorland Breeding Bird Surveys: greylag goose and four breeding wader species were recorded within (or just outwith) 500 m of Drum Hollistan Wind Farm⁴⁷:

- Greylag goose: single territories in 2015 and 2016, both of which were more than 500 m away from the Development;
- Golden plover: two territories in 2015, one of which was within 500 m of the Development, but no territories in 2016;
- Curlew: four territories in 2015 (including three that were just outwith the survey area), and two in 2016, all of which were more than 500 m away from the Development;
- Dunlin: a single territory in 2015 and two in 2016, all of which were more than 500 m away from the Development; and

⁶¹ Status of wind farms is as of 15 September 2020.

⁶² Relevant information from this SEI is cited in Section 8.5.3.1.

⁶³ Status of wind farms is as of 15 September 2020.

⁶⁴ The species could not be confirmed with 100% certainty due to poor light conditions, but it was considered likely that they were Greenland white-fronted geese

- **Snipe:** four territories in 2015, one of which was within 500 m of the Development, but no territories in 2016.

Breeding Raptor Surveys: Three Schedule 1 breeding raptor species were recorded; further details are provided in Appendix A8.5.

Breeding Diver Surveys: No breeding diver territories were identified.

Foraging Goose Surveys: Observations during both non-breeding seasons indicated that greylag geese occasionally foraged area around Loch na Moine approximately 1 km to the north-east of Drum Hollistan Wind Farm boundary⁴⁷ and was associated with roosting at Loch Hollistan and/ or Loch na Moine.

Additional Target Species: Other target species recorded included great skua, which was occasionally observed flying along the coast to the north of Drum Hollistan Wind Farm⁴⁷ and at Loch Hollistan, and single registrations of Arctic skua and crane (*Grus grus*) in 2016. It was also noted that, in 2016, Arctic terns bred at the same location where they were recorded during 2018 Baseline Ornithology Surveys for the Development (see Section 8.4.2.2). The number of birds and colony nest site were not described, but it is likely that the same site was used in both years. Details of the 2018 location are included in Appendix A8.5. A historic red-throated diver breeding territory within 2 km of the Site was also referenced in the NatureScot response to the Drum Hollistan 2 Wind Farm; further details are included in Appendix A8.5.

Based on baseline survey results, it was considered that small numbers of breeding waders could be displaced by Drum Hollistan Wind Farm⁴⁷ (up to two golden plover and snipe territories and a single curlew territory), but it was considered unlikely that there would be any disturbance to any Schedule 1 breeding birds.

With the exception of greylag goose, collision risk to all qualifying features of SPAs with potential connectivity to Drum Hollistan Wind Farm⁴⁷ was predicted to be less than one collision over the 25-year lifespan of the proposed Drum Hollistan Wind Farm. Mean annual collision risk for greylag goose was estimated as 1.5 birds.

It was noted that the greylag goose foraging and roosting area was located on the same side of the Drum Hollistan Wind Farm site⁴⁷ as the Caithness Lochs SPA, and therefore the proposed development would not form a barrier between the foraging/roosting areas and the SPA.

8.4.1.3 Expert Opinion

As Carl Mitchell was on furlough due to Covid-19, his expert opinion on potential effects of the development on common scoter could not be obtained. However, the appraisal of the likely significant effect of Beinneun Wind Farm on the West Inverness-shire Lochs SPA breeding common scoter population included expert opinions on this species, some of which are relevant to the assessment of potential effects of the Development on this species, and are therefore referenced in Section 8.5.3.2.

8.4.2 Baseline Surveys

A summary of key results recorded during each Baseline Ornithology Survey is provided below. Additional details are presented in Appendices A8.1 and A8.2. Note that the results of the first year of surveys completed between April 2014 and March 2015 (inclusive) were not included in the assessment because they are now more than five years old. However, for completeness, and because they provide contextual information, these results are included below.

8.4.2.1 Flight Activity Surveys

During the 2014-16 Flight Activity Surveys, a total of 279 flights by 25 target species⁶⁵ were recorded. Flight activity was similar between the two years, with a total of 148 flights during 2014-15 and 131 during 2015-16. In both years levels of flight activity were highest during the breeding season, with very few flights recorded during the non-breeding seasons.

The overall levels of flight activity in 2018 (196 flights by 22 target species⁶⁵) was higher than during each of the previous two survey years, despite the substantially shorter survey period.

A similar suite of species was recorded during all three years. With the exception of Arctic tern, which was recorded in high numbers in 2018, greylag goose was the species recorded most frequently during all three survey years (29 flights in both 2014-15 and 2018; 34 flights in 2015-16), followed by curlew (21, 33 and 16 flights in 2014-15, 2015-16 and 2018 respectively). With the exception of snipe in 2014-15 and 2015-16 (16 and 12 flights respectively) and lapwing in 2018 (16 flights), annual flight activity for all other target species was low during all survey years, with no more than ten flights of each species recorded.

A summary of all target species flights recorded during the Flight Activity Surveys, broken down by species, is provided in Table 8.10.

⁶⁵ Note that mallard and kestrel were recorded as target species during the 2014-16 surveys, but as secondary species during the 2018 surveys

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Table: 8.10 Summary of Target Species Flights Recorded During the 2014-16 & 2018 Flight Activity Surveys

| Species* | | Year (and start/end months) | Number of flights | | | | Number of birds per flight |
|-----------------------------------|-----------------------------|-----------------------------|-----------------------------|---------------------------------|-----------------------------------|-----------|----------------------------|
| English (British) vernacular name | Scientific name | | Breeding season (Apr-Aug)** | Non-breeding season (Sep-Mar)** | Early spring (Feb-Mar; 2018 only) | Total | |
| Greylag goose | <i>Anser anser</i> | 2014-2015 (Apr to Mar) | 18 | 11 | - | 29 | 1-28 |
| | | 2015-16 (Apr to Mar) | 29 | 5 | - | 34 | 1-49 |
| | | 2018 (Feb to Aug) | 22 | - | 7 | 29 | 1-30 |
| Pink-footed goose | <i>Anser brachyrhynchus</i> | 2014-2015 (Apr to Mar) | 4 | 3 | - | 7 | 3-41 |
| | | 2015-16 (Apr to Mar) | 8 | 1 | - | 9 | 4-90 |
| | | 2018 (Feb to Aug) | 10 | - | 0 | 10 | 10-42 |
| Whooper swan | <i>Cygnus cygnus</i> | 2014-2015 (Apr to Mar) | 0 | 2 | - | 2 | 2-15 |
| | | 2015-16 (Apr to Mar) | 0 | 0 | - | 0 | - |
| | | 2018 (Feb to Aug) | 0 | - | 0 | 0 | - |
| Shelduck | <i>Tadorna tadorna</i> | 2014-2015 (Apr to Mar) | 1 | 0 | - | 1 | 4 |
| | | 2015-16 (Apr to Mar) | 4 | 0 | - | 4 | 1-2 |
| | | 2018 (Feb to Aug) | 1 | - | 0 | 1 | 2 |
| Mallard*** | <i>Anas platyrhynchos</i> | 2014-2015 (Apr to Mar) | 3 | 0 | - | 3 | 1-2 |
| | | 2015-16 (Apr to Mar) | 2 | 0 | - | 2 | 2 |
| Teal | <i>Anas crecca</i> | 2014-2015 (Apr to Mar) | 0 | 0 | - | 0 | - |
| | | 2015-16 (Apr to Mar) | 0 | 0 | - | 0 | - |
| | | 2018 (Feb to Aug) | 1 | - | 0 | 1 | 1 |
| Goldeneye | <i>Bucephala clangula</i> | 2014-2015 (Apr to Mar) | 1 | 0 | - | 1 | 1 |
| | | 2015-16 (Apr to Mar) | 0 | 1 | - | 1 | 1 |

| Species* | | Year (and start/end months) | Number of flights | | | | Number of birds per flight |
|-----------------------------------|--------------------------|-----------------------------|-----------------------------|---------------------------------|-----------------------------------|-----------|----------------------------|
| English (British) vernacular name | Scientific name | | Breeding season (Apr-Aug)** | Non-breeding season (Sep-Mar)** | Early spring (Feb-Mar; 2018 only) | Total | |
| | | 2018 (Feb to Aug) | 0 | - | 1 | 1 | 1 |
| Red-throated diver | <i>Gavia stellata</i> | 2014-2015 (Apr to Mar) | 10 | 0 | - | 10 | 1-2 |
| | | 2015-16 (Apr to Mar) | 4 | 0 | - | 4 | 1-2 |
| | | 2018 (Feb to Aug) | 5 | - | 0 | 5 | 1-2 |
| Black-throated diver | <i>Gavia arctica</i> | 2014-2015 (Apr to Mar) | 0 | 0 | - | 0 | - |
| | | 2015-16 (Apr to Mar) | 5 | 0 | - | 5 | 1-3 |
| | | 2018 (Feb to Aug) | 0 | - | 0 | 0 | - |
| Grey heron | <i>Ardea cinerea</i> | 2014-2015 (Apr to Mar) | 2 | 0 | - | 2 | 1 |
| | | 2015-16 (Apr to Mar) | 3 | 0 | - | 3 | 1 |
| | | 2018 (Feb to Aug) | 4 | - | 1 | 5 | 1 |
| Osprey | <i>Pandion haliaetus</i> | 2014-2015 (Apr to Mar) | 0 | 0 | - | 0 | - |
| | | 2015-16 (Apr to Mar) | 3 | 0 | - | 3 | 1 |
| | | 2018 (Feb to Aug) | 3 | - | 0 | 3 | 1 |
| Golden eagle | <i>Aquila chrysaetos</i> | 2014-2015 (Apr to Mar) | 1 | 1 | - | 2 | 1 |
| | | 2015-16 (Apr to Mar) | 0 | 1 | - | 1 | 1 |
| | | 2018 (Feb to Aug) | 1 | - | 0 | 1 | 1 |
| Hen harrier | <i>Circus cyaneus</i> | 2014-2015 (Apr to Mar) | 9 | 1 | - | 10 | 1 |
| | | 2015-16 (Apr to Mar) | 3 | 3 | - | 6 | 1 |
| | | 2018 (Feb to Aug) | 9 | - | 0 | 9 | 1-2 |
| White-tailed eagle | | 2014-2015 (Apr to Mar) | 0 | 0 | - | 0 | - |

| Species* | | Year (and start/end months) | Number of flights | | | | Number of birds per flight |
|-----------------------------------|------------------------------|-----------------------------|-----------------------------|---------------------------------|-----------------------------------|-----------|----------------------------|
| English (British) vernacular name | Scientific name | | Breeding season (Apr-Aug)** | Non-breeding season (Sep-Mar)** | Early spring (Feb-Mar; 2018 only) | Total | |
| | <i>Haliaeetus albicilla</i> | 2015-16 (Apr to Mar) | 0 | 0 | - | 0 | - |
| | | 2018 (Feb to Aug) | 3 | - | 0 | 3 | 1 |
| Oystercatcher | <i>Haematopus ostralegus</i> | 2014-2015 (Apr to Mar) | 0 | 0 | - | 0 | - |
| | | 2015-16 (Apr to Mar) | 0 | 0 | - | 0 | - |
| | | 2018 (Feb to Aug) | 2 | - | 0 | 2 | 1-2 |
| Lapwing | <i>Vanellus vanellus</i> | 2014-2015 (Apr to Mar) | 3 | 0 | - | 3 | 1 |
| | | 2015-16 (Apr to Mar) | 4 | 0 | - | 4 | 1-2 |
| | | 2018 (Feb to Aug) | 10 | - | 3 | 13 | 1-31 |
| Golden plover | <i>Pluvialis apricaria</i> | 2014-2015 (Apr to Mar) | 3 | 5 | - | | 1-35 |
| | | 2015-16 (Apr to Mar) | 2 | 0 | - | 2 | 1 |
| | | 2018 (Feb to Aug) | 1 | - | 0 | 1 | 23 |
| Curlew | <i>Numenius arquata</i> | 2014-2015 (Apr to Mar) | 21 | 0 | - | 21 | 1 |
| | | 2015-16 (Apr to Mar) | 33 | 0 | - | 33 | 1-2 |
| | | 2018 (Feb to Aug) | 16 | - | 0 | 16 | 1-2 |
| Dunlin | <i>Calidris alpina</i> | 2014-2015 (Apr to Mar) | 5 | 0 | - | 5 | 1-2 |
| | | 2015-16 (Apr to Mar) | 2 | 0 | - | 2 | 1 |
| | | 2018 (Feb to Aug) | 0 | - | 0 | 0 | - |
| Snipe | <i>Gallinago gallinago</i> | 2014-2015 (Apr to Mar) | 16 | 0 | - | 16 | 1 |
| | | 2015-16 (Apr to Mar) | 12 | 0 | - | 12 | 1-4 |
| | | 2018 (Feb to Aug) | 6 | - | 0 | 6 | 1 |

| Species* | | Year (and start/end months) | Number of flights | | | | Number of birds per flight |
|-----------------------------------|---------------------------|-----------------------------|-----------------------------|---------------------------------|-----------------------------------|-----------|----------------------------|
| English (British) vernacular name | Scientific name | | Breeding season (Apr-Aug)** | Non-breeding season (Sep-Mar)** | Early spring (Feb-Mar; 2018 only) | Total | |
| Common sandpiper | <i>Actitis hypoleucos</i> | 2014-2015 (Apr to Mar) | 1 | 0 | - | 1 | 1 |
| | | 2015-16 (Apr to Mar) | 0 | 0 | - | 0 | - |
| | | 2018 (Feb to Aug) | 1 | - | 0 | 1 | 2 |
| Greenshank | <i>Tringa nebularia</i> | 2014-2015 (Apr to Mar) | 1 | 0 | - | 1 | 1 |
| | | 2015-16 (Apr to Mar) | 1 | 0 | - | 1 | 1 |
| | | 2018 (Feb to Aug) | 1 | - | 0 | 1 | 1 |
| Arctic tern | <i>Sterna paradisaea</i> | 2014-2015 (Apr to Mar) | 10 | 0 | - | 10 | 1-2 |
| | | 2015-16 (Apr to Mar) | 0 | 0 | - | 0 | - |
| | | 2018 (Feb to Aug) | 75 | - | 0 | 75 | 1-5 |
| Great skua | <i>Stercorarius skua</i> | 2014-2015 (Apr to Mar) | 4 | 0 | - | 4 | 1 |
| | | 2015-16 (Apr to Mar) | 0 | 0 | - | 0 | - |
| | | 2018 (Feb to Aug) | 1 | - | 0 | 1 | 1 |
| Short-eared owl | <i>Asio flammeus</i> | 2014-2015 (Apr to Mar) | 2 | 0 | - | 2 | 1 |
| | | 2015-16 (Apr to Mar) | 0 | 0 | - | 0 | - |
| | | 2018 (Feb to Aug) | 0 | - | 0 | 0 | - |
| Kestrel*** | <i>Falco tinnunculus</i> | 2014-2015 (Apr to Mar) | 0 | 3 | - | 3 | 1 |
| | | 2015-16 (Apr to Mar) | 0 | 0 | - | 0 | - |
| Merlin | <i>Falco columbarius</i> | 2014-2015 (Apr to Mar) | 4 | 0 | - | 4 | 1-2 |
| | | 2015-16 (Apr to Mar) | 3 | 0 | - | 3 | 1-2 |
| | | 2018 (Feb to Aug) | 6 | - | 0 | 6 | 1-2 |

| Species* | | Year (and start/end months) | Number of flights | | | | Number of birds per flight |
|--|-------------------------|-----------------------------|-----------------------------|---------------------------------|-----------------------------------|----------|----------------------------|
| English (British) vernacular name | Scientific name | | Breeding season (Apr-Aug)** | Non-breeding season (Sep-Mar)** | Early spring (Feb-Mar; 2018 only) | Total | |
| Peregrine | <i>Falco peregrinus</i> | 2014-2015 (Apr to Mar) | 2 | 1 | - | 3 | 1 |
| | | 2015-16 (Apr to Mar) | 2 | 0 | - | 2 | 1 |
| | | 2018 (Feb to Aug) | 3 | - | 3 | 6 | 1-2 |
| <p>Notes: * Species names and order in which they are listed follow the British List maintained by the BOU¹ ** During the Baseline Ornithology Surveys, generic breeding and non-breeding seasons were defined as April to August and September to March respectively; however, when completing the CRM, seasons were tailored to individual species, as described in Section 8.3.7 ***Not recorded as a target species in 2018</p> | | | | | | | |

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8.4.2.2 Moorland Breeding Bird Surveys

Eight wader species were confirmed as breeding or potentially breeding within the Moorland Breeding Bird Survey Area during one or more survey years.

During the 2018 surveys, it was also noted that a small colony of Arctic tern was established outwith the Moorland Breeding Bird Survey Area (the location is provided in Appendix A8.5), although the breeding attempt was thought to be unsuccessful. In addition, a small number of crossbill breeding territories were reported in 2018, and based on the electronic data, it was considered likely that small numbers of breeding territories were present during previous survey years (although no territories were identified or reported by RPS).

Although not reported by RPS or Avian Ecology, based on the electronic data, it is considered that small numbers of the following species were breeding within 500 m of the Site Boundary:

- Greylag goose (is a designated feature of the Caithness and Sutherland Peatlands Ramsar site);
- Red grouse (*Lagopus lagopus*) and cuckoo, both of which are included on the “upland moorland with water bodies” list⁴² referenced by NatureScot (see Table 8.1) and may therefore be part of the East Halladale SSSI breeding bird assemblage.

A summary of numbers of breeding territories of each of these species is provided in Table 8.11. Territory locations⁶⁶ of species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)⁷ or Annex I of the Birds Directive³ are presented in Figures A8.5.12, A8.5.17 and A8.5.18 of Appendix A8.5), while those of other species are shown in Figures 8.4-8.6.

Numbers of territories are based on summary reports by RPS (Appendix A8.1) and Avian Ecology (Appendix A8.2). However, these estimates were re-evaluated using all available data (including incidental registrations, where breeding behaviour was noted) to include all territories within 500 m of the Site Boundary, and revised where appropriate. A conservative approach was adopted with evidence of possible or likely breeding included as potential breeding territories.

Table 8.11: Total Numbers of Confirmed and Potential Breeding Territories

| Species* | | Conservation listings** | Minimum no. of confirmed and potential breeding territories/pairs | | |
|-----------------------------------|------------------------------|-------------------------|---|------|------|
| English (British) vernacular name | Scientific name | | 2014 | 2015 | 2018 |
| Greylag goose | <i>Anser anser</i> | Amber | 1 | 3 | 1 |
| Red grouse | <i>Lagopus lagopus</i> | Amber; SBL | 3 | 1 | 10 |
| Oystercatcher | <i>Haematopus ostralegus</i> | Amber | 1 | 1 | 1 |
| Lapwing | <i>Vanellus vanellus</i> | Red; SBL | 2 | 1 | 3 |
| Golden plover | <i>Pluvialis apricaria</i> | Ann I; SBL | 2*** | 1 | 0 |
| Curlew | <i>Numenius arquata</i> | Red; SBL | 5 | 3 | 6 |
| Dunlin | <i>Calidris alpina</i> | Ann I; Amber; SBL | 1 | 2*** | 0 |

⁶⁶ As RPS did not map territory locations, those in 2014 and 2015 are inferred from digitised data; note that this included several territories outwith the Moorland Breeding Bird Survey Area but within 500 m of the Site Boundary.

| Species* | | Conservation listings** | Minimum no. of confirmed and potential breeding territories/pairs | | |
|-----------------------------------|----------------------------|-------------------------|---|------|------|
| English (British) vernacular name | Scientific name | | 2014 | 2015 | 2018 |
| Snipe | <i>Gallinago gallinago</i> | Amber | 3 | 3 | 6 |
| Common sandpiper | <i>Actitis hypoleucos</i> | Amber | 1*** | 0 | 0 |
| Greenshank | <i>Tringa nebularia</i> | Sch 1; Amber | 0 | 0 | 1 |
| Arctic tern | <i>Sterna paradisaea</i> | Ann I; Amber; SBL | 0 | 0 | 6 |
| Cuckoo | <i>Cuculus canorus</i> | Red; SBL | 2 | 2 | 0 |
| Crossbill | <i>Loxia curvirostra</i> | Sch 1 | 2 | 2 | 3-6 |

* Species names and order in which they are listed follow the British List maintained by the BOU¹

** Ann I = species listed on Annex I of the Birds Directive³; Sch 1 = Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)⁷; Red and Amber = species listed on the UK BoCC²³ Red and Amber lists respectively; SBL = species listed on the SBL²⁹

*** The numbers of territories reported in Appendices A8.1 and A8.2 have been amended, based on all available data

8.4.23 Breeding Raptor Surveys

Target Raptor Species

Seven target raptor species were recorded during the Breeding Raptor Surveys: osprey, golden eagle, hen harrier, white-tailed eagle, short-eared owl, merlin and peregrine. There were also incidental records of these species during other breeding season surveys. Registrations are summarised in Table 8.12, with details of breeding territories presented in Appendix A8.5.

Table 8.12: Summary of Target Raptor Species Recorded during Breeding Raptor Surveys and Evidence of Breeding

| Species | Survey year | | | Evidence of breeding |
|--------------|---|---|--|--|
| | 2014 | 2015 | 2018 | |
| Osprey | There were no records of osprey during the 2014 Breeding Raptor Surveys and no incidental records during other 2014 breeding season surveys. | There were three registrations of a single osprey during the 2015 Breeding Raptor Surveys: a bird over the estuary being mobbed by two teal on 01/07/2015; a bird being mobbed by a common gull on the approach to Loch Hollistan on 07/07/2015; and an observation on 19/08/2015. There were two incidental registrations of single, hunting birds during Breeding Diver Surveys: one on 30/06/2015 and the second on 03/07/2015. | There were no observations of this species during the 2018 Breeding Raptor Surveys and no incidental records during other 2018 breeding season surveys. | No breeding behaviour was observed during Baseline Ornithology Surveys and no breeding territories within 750 m ⁶⁷ of the Site were identified during the Desk Study. |
| Golden eagle | There were no records of golden eagle during the 2014 Breeding Raptor Surveys. The only incidental record during the 2014 breeding season was a single, immature bird (4-5 years old) observed during a Breeding Diver Survey on 15/07/2014. The bird was being mobbed by a raven, and possibly a short-eared owl. | The only registration of this species during the 2015 Breeding Raptor Surveys was an unaged bird was flying over Drum Hollistan (to the north-east of the Site Boundary) on 08/04/2015. No incidental records of golden eagle were recorded during the 2015 breeding season surveys. | There were five registrations of this species during the 2018 Breeding Raptor Surveys, all of which were recorded on 24/05/2018, and involved at least two individuals (an adult and a juvenile). There were no incidental records of golden eagle during the 2018 breeding season surveys. | No breeding behaviour was observed during Baseline Ornithology Surveys, and some registrations may relate to wandering, non-breeding birds. Desk Study records of this species are detailed in Appendix A8.5, but no breeding territories within 1.5 km ⁶⁷ of the Site were identified. |
| Hen harrier | There was a single registration of a 'ringtail' (female or immature) hen harrier during a Breeding Raptor Survey on 03/08/2014. | There were three registrations of a single female hen harrier during the 2015 Breeding Raptor Surveys, one on 14/05/2015 and two to the east on 24/08/2015. | The only observation of hen harrier during the 2018 Breeding Raptor Surveys was a single male hunting over Golval Hill in the south of the Site on 01/05/2018. | Based on the single observation of breeding behaviour in 2018, it is possible that a breeding territory was present within the Breeding Raptor Survey Area. However, no further evidence of breeding was observed during subsequent, |

⁶⁷ The maximum species-specific buffer distance recommended in Ruddock & Whitfield (2007)

| Species | Survey year | | | Evidence of breeding |
|--------------------|---|--|--|---|
| | 2014 | 2015 | 2018 | |
| | There were no incidental records of this species during the 2014 breeding season. | There were also three incidental records of single birds during the 2015 Moorland Breeding Bird Surveys: a female bird on 20/04/2015, a male on 29/05/2015 and an unsexed bird on 26/07/2015. | However, during other breeding season surveys, breeding behaviour was observed on a single occasion in early July. | Breeding Raptor Surveys or other breeding season surveys, indicating that either successful breeding did not take place, or birds were not breeding close to the registration. Desk Study records of this species are detailed in Appendix A8.5, but no breeding territories were identified within 750 m ⁶⁷ of the Site. |
| White-tailed eagle | There were three registrations of a single white-tailed eagle during the 2014 Breeding Raptor Surveys: two of an immature bird on 24/05/2014, one over the western side of the Site and one to the north-east (flying towards the coast on both occasions); and one of an adult/near-adult bird on 12/06/2014. There were no incidental records of this species during the 2014 breeding season. | There were no records during the 2015 Breeding Raptor Surveys. There were two incidental registrations of a single bird during the 2015 breeding season: an unaged bird during a Moorland Breeding Bird Survey on 29/05/2015; and an immature bird during a Focal Loch Watch on 28/07/2015. | The only registration of this species during the 2018 Breeding Raptor Surveys was a single juvenile over the north-east tip of the Site and surrounding area on 24/05/2018. There were no incidental registrations of this species during the 2018 breeding season. | No breeding behaviour was observed during the Baseline Ornithology Surveys and it is considered likely that registrations related to wandering individuals rather than a breeding territory. No breeding territories were identified within 1.5 km ⁶⁷ of the Site during the Desk Study. |
| Short-eared owl | There were two registrations of a single short-eared owl in suitable breeding habitat during a Breeding Raptor Survey on 25/05/2014. The only incidental record of this species was a possible short-eared owl mobbing an immature golden eagle during a Breeding Diver Survey on 15/07/2014. | There were no observations of this species during the 2015 Breeding Raptor Surveys and no incidental records during other 2015 breeding season surveys. | There were no observations of this species during the 2018 Breeding Raptor Surveys and no incidental records during other 2018 breeding season surveys. | Based on the presence of two flights of a single bird in suitable breeding habitat in late May 2014, RPS determined that a possible breeding territory was present. However, based on the lack of further observations, it is considered unlikely that breeding took place. No records of historic breeding territories were identified within |

| Species | Survey year | | | Evidence of breeding |
|-----------|--|--|---|--|
| | 2014 | 2015 | 2018 | |
| | | | | 500 m ⁶⁷ of the Site during the Desk Study. |
| Merlin | <p>A single registration of an unsexed bird on 02/08/2014 was the only observation of this species during the 2014 Breeding Raptor Surveys. However, the observation of two juveniles during another survey indicated that breeding had taken place within the Breeding Raptor Survey Area.</p> <p>In addition, there were two incidental records of a single female: the first during a Moorland Breeding Bird Survey on 17/07/2014; and the second of a bird hunting over moorland as the surveyor approached a VP to complete a Flight Activity Survey on 25/07/2014.</p> | <p>There were four registrations of a single merlin during Breeding Raptor Surveys between early April and mid-July.</p> <p>There were three incidental registrations of a single female bird observed during Flight Activity Surveys and Focal Loch Watches between late July and mid-August.</p> | <p>There were several registrations during the 2018 Breeding Raptor Surveys, and a nest was confirmed to be present within the Breeding Raptor Survey Area.</p> <p>There were no incidental registrations of this species during the 2018 breeding season.</p> | <p>Breeding was confirmed in 2018 and it was considered likely that this territory was also active in 2014. Desk Study records of this species are detailed in Appendix A8.5, but no additional breeding territories were identified within 500 m⁶⁷ of the Site.</p> |
| Peregrine | <p>There were four registrations of a single peregrine during the 2014 Breeding Raptor Surveys, one on 06/04/2014, two on 25/05/2014 and one on 12/06/2014. At least three individuals were observed (an adult male, an adult female and a probable immature bird).</p> <p>The only incidental record was an unaged bird observed during a Breeding Diver Survey on 01/07/2014.</p> | <p>The only registration of this species during the 2015 Breeding Raptor Surveys was an unaged/unsexed bird observed on 20/08/2015.</p> <p>There were three incidental registrations of this species during the 2015 breeding season: one of an unaged/unsexed bird during a Moorland Breeding bird Survey on 23/04/2015 and two of an adult female observed during a Breeding Diver Survey on 16/08/2015.</p> | <p>A total of five registrations of 1-2 birds were recorded to the west and south of the Core Study Area during the 2018 Breeding Raptor Surveys. Observations comprised a minimum of three individuals (two adult females and an adult male).</p> <p>There were no incidental registrations of this species during the 2018 breeding season.</p> | <p>No breeding behaviour was observed during Baseline Ornithology Surveys, and some registrations may relate to non-breeding birds. Desk Study records of this species are detailed in Appendix A8.5, but no breeding territories were identified within 750 m⁶⁷ of the Site.</p> |

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Secondary Raptor Species

Secondary species recorded in 2015 and 2016 included buzzard, sparrowhawk and kestrel; observations are summarised below.

- **Buzzard:** there was regular flight activity over the western side of the Core Study Area and adjacent Buffer Area in both 2014 and 2015, and an occupied buzzard nest was identified near the cemetery to the west of the Core Study Area in 2014.
- **Sparrowhawk:** there were single registrations of this species to the west of the Core Study Area in both 2014 and 2015, indicating that a breeding territory may have been present in both years, although no nest sites were identified.
- **Kestrel:** occasional flights were recorded in both 2014 and 2015, the majority to the north-west of the Core Study Area, suggesting that a breeding territory may have been present in this area during both years, although no nest sites were identified.

No observations of secondary raptor species were reported by Avian Ecology in 2018.

8.4.24 Breeding Diver Surveys and Focal Loch Watches

Red-throated Diver Registrations

Red-throated diver was regularly observed during Breeding Diver Surveys and Focal Loch Watches, as well as other breeding season surveys, and was confirmed to be breeding within the Breeding Diver Survey Area during all survey years. Further details of all breeding territories are provided in Appendix A8.5.

Black-throated Diver Registrations

A single registration of a black-throated diver on Loch Akran on 28/05/2014 was the only registration of this species in 2014. Although several black-throated diver flights were recorded during the 2015 Flight Activity Surveys, no evidence of breeding was observed and there were no observations of this species during the 2015 Breeding Diver Surveys. However, as it is possible that this could be used as a breeding site in future, flight lines are shown in Figure 8.5.11, Appendix A8.5. A single black-throated diver observed during a Focal Loch Watch on 01/08/2018 was the only registration of this species in 2018; no evidence of breeding was observed.

8.4.25 Winter Bird Surveys

Key Target Species

The only designated feature of the Caithness Lochs SPA and Ramsar site recorded during the 2014-15 and 2015-16 Winter Bird Surveys was greylag goose; registrations of this species are summarised below.

- **14/01/2015:** a flock of 54 birds was recorded just beyond the western boundary of the Site, to the south of Halladale Bridge.
- **25/02/2015:** three birds were recorded just beyond the western boundary, to the south-east of Halladale Bridge.
- **24/03/2016:** a flock of 22 birds were recorded flying over the north-western corner of the Site.
- **24/03/2016:** two birds were observed just beyond the western boundary of the Site, to the south of Halladale Bridge.

Other Target Species

A number of other target species were recorded during the Winter Bird Surveys, including two species that are designated features of the Caithness and Sutherland Peatlands SPA and Ramsar site, namely hen harrier and golden plover. Although these designations relate to breeding birds, it is possible that there could be some connectivity between breeding and wintering populations. Registrations of these and other target species are summarised below.

- Pink-footed goose: six birds were observed on 06/11/2014 just beyond the western boundary of the Site, to the south of Halladale Bridge.
- Goldeneye: there were two registrations of a single bird on Caol-Loch, a female on 26/02/2015 and a male on 25/02/2016.
- Hen harrier: there were two registrations of a male bird in early 2016, one near Caol-Loch on 25/02/2016, and one just to the north of the Site on 24/03/2016.
- Lapwing: there was a single registration of four lapwing to the west of the Site, between Halladale Bridge and Golval on 24/03/2016.
- Golden plover: there were three registrations of birds in flight on, a single bird just to the north-east of the Site over Drum Hollistan on 18/12/2015, seven birds in the west of the Site over the lower slopes of Golval Hill on 25/02/2015 and three birds observed to the east of Caol-Loch the following day.
- Curlew: a single bird was observed just beyond the western boundary of the Site, to the south of Halladale Bridge, on 25/02/2015.
- Woodcock: a single bird was observed flying over the edge of the plantation in the north-west of the Site on 14/01/2015.
- Jack snipe (*Lymnocyptes minimus*): a single bird was observed flying over the north-eastern corner of the Site on 25/02/2015.
- Snipe: there were ten registrations of single birds, three during the 2014-15 surveys and seven during the 2015-16 surveys. Registrations were concentrated in in the north-east of the Survey Area.
- Kestrel: there were two registrations of single birds in November 2014, a male observed close to Giligill Burn in the north-east of the Site on 05/11/2014 and an unsexed bird over the west of the Site the following day.

8.4.3 Incidental Records

Incidental records of red-throated diver and protected raptor species recorded during the Baseline Ornithology Surveys are summarised in Sections 8.4.2.3 and 8.4.2.4 respectively. Incidental records of other notable species⁶⁸ are summarised in Table 8.13.

Table: 8.13 Summary of Incidental Records of Notable Species⁶⁸ (Excluding Divers and Protected Raptors) Observed during the 2014 and 2015 Baseline Ornithology Surveys

| Species | 2014 Breeding Season | 2015 Breeding Season |
|-------------------|--|--|
| Greylag goose | <ul style="list-style-type: none"> • A flock of 20 birds was observed during a Breeding Raptor Survey on 07/04/2014 • Four registrations of 1-2 birds during Flight Activity, Breeding Diver and breeding Raptor Surveys between mid-June and mid-July, including a pair of displaying birds | <ul style="list-style-type: none"> • Seventeen registrations of 1-10 birds during Breeding Diver and Raptor Surveys and Focal Loch Watches between mid-May and mid-August • Two registrations of mixed age flocks (adults and juveniles) numbering 30-32 birds, observed during Breeding Diver Surveys in June |
| Pink-footed goose | - | <ul style="list-style-type: none"> • A single bird observed during a Breeding Raptor Survey on 09/04/2015 |

⁶⁸ Defined as species that are designated features of SPAs or Ramsar sites with potential connectivity to the Site, species identified in SNH guidance³⁴ as priority species for assessment and other species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)⁷ and/or Annex I of the Birds Directive³

| Species | 2014 Breeding Season | 2015 Breeding Season |
|----------------|---|---|
| Lapwing | <ul style="list-style-type: none"> • A single bird observed during a Breeding Diver Survey on 15/07/2014 | <ul style="list-style-type: none"> • Three registrations of single birds observed during Breeding Raptor and Diver Surveys between mid-May and mid-June, including two birds on nests • A post-breeding flock of 28 birds observed during a Breeding Diver Survey on 30/06/2015 |
| Golden plover | <ul style="list-style-type: none"> • Three registrations of 2-3 birds during Breeding Raptor and Diver Surveys between early April and late June, including an adult pair with a fledgling | <ul style="list-style-type: none"> • Two registrations of single birds observed during a Breeding Raptor and diver Surveys on 09/04/2015 |
| Curlew | <ul style="list-style-type: none"> • Four registrations of single birds observed during Breeding Raptor Surveys and Focal Loch Watches between early April and early July, including a displaying bird • An adult with a chick observed during a Flight Activity Survey on 03/07/2014 | <ul style="list-style-type: none"> • Eight registrations of single birds observed during Breeding Raptor Surveys and Focal Loch Watches between early April and mid-August • An adult with a chick observed during a Flight Activity Survey on 30/05/2015 |
| Dunlin | <ul style="list-style-type: none"> • A single bird singing during a Flight Activity Survey on 30/06/2014 • Two registrations of a single, calling dunlin during a Breeding Raptor Survey on 15/07/2014 | <ul style="list-style-type: none"> • Seven registrations of single birds, one of two birds and one of three birds, observed during Breeding Diver and Raptor Surveys between mid-May and mid-August, including two of alarm-calling birds |
| Wood sandpiper | - | <ul style="list-style-type: none"> • A single registration of a bird in flight during a Focal Loch Watch on 17/08/2015 |
| Arctic tern | <ul style="list-style-type: none"> • A single registration of two birds during a Focal Loch Watch on 08/07/2014 | - |
| Great skua | <ul style="list-style-type: none"> • A single bird observed during a Breeding Diver Survey on 16/08/2014 | <ul style="list-style-type: none"> • Two registrations during Breeding Raptor Surveys: a single bird on 01/07/2015 and two birds on 20/08/2015 |

In addition, there were incidental records of two Schedule 1 species during Site visits in 2019 and 2020, with observations indicating that both species were breeding. Further details are provided in Appendix A8.5.

8.4.4 Collision Risk Modelling

For each species for which CRM was completed, the annual/seasonal risks of collision and number of years per collision, (a) assuming no avoidance and (b) using species-specific avoidance rates recommended by NatureScot⁵⁹ are presented in Table 8.14.

Table 8.14: Estimated Seasonal Collision Risk and Number of Years Per Collision for Species for Which CRM Was Completed

| Species | Period ⁵⁶ | Annual collision risk (no. of birds killed) | | No. of years per collision | |
|--------------------|---------------------------------|---|---|----------------------------|---|
| | | Assuming no avoidance | Using species-specific avoidance rates* | Assuming no avoidance | Using species-specific avoidance rates* |
| Greylag goose | 2015-16 Non-breeding season | 10.784 | 0.022 | 0.093 | 46.364 |
| | 2015 breeding season | 8.694 | 0.017 | 0.115 | 57.513 |
| | 2015-16 whole year | 19.478 | 0.039 | 0.051 | 25.641 |
| | 2018 breeding season | 7.611 | 0.015 | 0.131 | 65.691 |
| | Breeding season mean | 9.198 | 0.019 | 0.109 | 52.632 |
| Red-throated diver | 2014 breeding season/whole year | 2.966 | 0.015 | 0.337 | 67.420 |
| | 2015 breeding season/whole year | 0.820 | 0.004 | 1.219 | 243.796 |
| | 2018 breeding season | 1.116 | 0.006 | 0.896 | 179.256 |
| | Breeding season mean | 1.634 | 0.008 | 0.612 | 125.000 |
| Osprey | 2015 breeding season/whole year | 0.640 | 0.013 | 1.563 | 78.167 |
| | 2018 breeding season | 0.278 | 0.006 | 3.603 | 180.128 |
| | Breeding season mean | 0.459 | 0.009 | 2.180 | 109.023 |
| Hen harrier | 2015-16 Non-breeding season | 0.155 | 0.002 | 2.559 | 255.943 |
| | 2015 breeding season | 0.236 | 0.002 | 4.243 | 424.321 |
| | 2015-16 whole year | 0.391 | 0.004 | 6.450 | 644.985 |
| | 2018 breeding season | 0.824 | 0.008 | 1.214 | 121.427 |
| | Breeding season mean | 0.530 | 0.005 | 1.888 | 188.819 |
| White-tailed eagle | 2015 breeding season/whole year | 0 | 0 | N/A | N/A |

| Species | Period ⁵⁶ | Annual collision risk (no. of birds killed) | | No. of years per collision | |
|---------------|---------------------------------|---|---|----------------------------|---|
| | | Assuming no avoidance | Using species-specific avoidance rates* | Assuming no avoidance | Using species-specific avoidance rates* |
| | 2018 breeding season | 0.294 | 0.015 | 3.403 | 68.055 |
| | Breeding season mean | 0.141 | 0.007 | 6.806 | 136.111 |
| Lapwing | 2015 breeding season/whole year | 0.589 | 0.012 | 1.697 | 84.864 |
| | 2018 breeding season | 0.579 | 0.012 | 1.728 | 86.421 |
| | Breeding season mean | 0.584 | 0.012 | 1.713 | 85.635 |
| Golden plover | 2015 breeding season/whole year | 0.063 | 0.001 | 15.841 | 792.044 |
| | 2018 breeding season | 1.616 | 0.032 | 0.619 | 30.933 |
| | Breeding season mean | 0.840 | 0.017 | 1.191 | 59.541 |
| Curlew | 2015 breeding season/whole year | 3.319 | 0.066 | 0.301 | 15.065 |
| | 2018 breeding season | 0.764 | 0.015 | 1.309 | 65.453 |
| | Breeding season mean | 2.041 | 0.041 | 0.490 | 24.493 |
| Snipe | 2015 breeding season/whole year | 2.165 | 0.043 | 0.462 | 23.099 |
| | 2018 breeding season | 0.169 | 0.003 | 5.924 | 296.214 |
| | Breeding season mean | 1.167 | 0.023 | 0.857 | 42.855 |
| Arctic tern | 2015 breeding season/whole year | 0 | 0 | N/A | N/A |
| | 2018 breeding season | 32.145 | 0.643 | 0.031 | 1.555 |
| | Breeding season mean | 16.073 | 0.322 | 0.062 | 3.106 |
| Merlin | 2015 breeding season/whole year | 0.710 | 0.014 | 1.409 | 70.449 |

| Species | Period ⁵⁶ | Annual collision risk (no. of birds killed) | | No. of years per collision | |
|-----------|---------------------------------|---|---|----------------------------|---|
| | | Assuming no avoidance | Using species-specific avoidance rates* | Assuming no avoidance | Using species-specific avoidance rates* |
| | 2018 breeding season | 0.177 | 0.004 | 5.659 | 282.937 |
| | Breeding season mean | 0.443 | 0.009 | 2.256 | 112.809 |
| Peregrine | 2015 breeding season/whole year | 0.032 | 0.001 | 30.867 | 1,543.366 |
| | 2018 breeding season | 0.648 | 0.013 | 1.543 | 77.169 |
| | Breeding season mean | 0.340 | 0.007 | 2.940 | 146.989 |

*As per NatureScot guidance⁵⁹, this was 95% for white-tailed eagle; 98% for osprey, lapwing, golden plover, curlew, snipe, Arctic tern, merlin and peregrine; 99% for hen harrier; 99.5% for red-throated diver and black-throated diver; and 99.8% for greylag goose

8.5 ASSESSMENT OF POTENTIAL EFFECTS

8.5.1 Potential Effects on Birds

The main ways in which a wind farm may affect IOFs are via:

- Habitat loss due to land-take;
- Habitat modification;
- Disturbance/displacement;
- Barrier effects; and
- Collision with turbines.

Each of these potential effects during each phase of the Development life cycle (construction, operation and decommissioning) is discussed in turn below.

In addition, as noted previously, cumulative effects may arise as a result of the combined effects of multiple wind farms affecting the same bird population. Cumulative effects are considered in Section 8.6.

8.5.1.1 Effects during Construction

Habitat Loss

Construction of turbine bases and associated infrastructure will lead to direct habitat loss. The severity of potential effects resulting from habitat loss is dependent on the extent of land-take, the type of habitat affected and the species using the Site and surrounding area. In this case, the extent of habitat loss will be relatively small (an estimated 10.85 ha in total), and will predominantly comprise dwarf shrub heath habitats. As numbers of breeding and foraging birds within the Core Study Area that are currently supported by these habitats are relatively low, it is likely that species affected by habitat loss can be accommodated by suitable habitat in the wider area, where optimal habitat is present for many breeding species, notably within the Caithness and Sutherland Peatlands SPA and Ramsar site.

Habitat Modification

As part of the land-take, it is expected that a very small amount (estimated 1.1 Ha) of coniferous woodland (plantation) may be felled. Furthermore, as outlined in Section 8.3.10, peatland restoration will take place as part of the embedded mitigation. Felling of the plantation and restoration of the peatland habitats on Site may result in a long-term improvement of suitable habitat for certain IOFs such as waders and raptors. This will likely result in the loss of suitable breeding/foraging habitat for crossbill and other woodland breeding birds, but the extent will be negligible and it is considered unlikely that habitat modification will result in significant changes in Site use by IOFs during the construction phase.

Disturbance and Displacement

During the construction phase of the Development, there will be increased levels of activity by site personnel, vehicles, and machinery, resulting in increased levels of noise and visual disturbance. This could lead to the temporary displacement or disruption of breeding, foraging and/or roosting birds. The severity of potential effects depends on the following:

- The timing of works, with potential effects likely to be greatest during the breeding season;
- The magnitude of the disturbance (e.g. a vehicle driving slowly along the access track without stopping is likely to result in a relatively low or even negligible magnitude of disturbance, whereas a period of prolonged and noisy machinery operation involving numerous site personnel is likely to be of high magnitude);
- The extent of displacement (both spatially and temporally);
- The availability of suitable habitats in the surrounding area for displaced birds to occupy; and
- The behavioural sensitivity of birds using the Site (which is likely to vary between species).

8.5.1.2 Effects during Operation

Habitat Modification

As described above, a small amount (estimated at 0.06 Ha) of habitat is expected to be felled prior to construction, and a limited amount of peatland habitat will be restored. As the habitat on Site is opened up and the peatland habitat restored, this could result in increased numbers of breeding waders such as curlew, while raptor species such as hen harrier, merlin and short-eared owl could forage over the restored area more frequently compared with pre-construction, and could feasibly breed there. With the exception of these species and a limited number of other birds considered to be of low conservation concern, it is considered unlikely that other species will make more frequent use of the Site following habitat modification. Although increased Site use could result in negative effects due to increased collision risk, a distance of 500 m between the turbines and areas of restored habitat will be maintained to minimise this risk, and it is expected that the habitat enhancements will result in a net gain for biodiversity, including IOFs.

Disturbance and Displacement

The operation of turbines and increased human activity associated with maintenance of the Development has the potential to cause disturbance and displace birds from the Site. However, disturbance effects during the operational phase may be of a lower magnitude than during construction, as species may become habituated to turbines, and the level of human activity and associated disturbance on Site will be considerably reduced compared to the construction phase.

Collision with Turbines

The frequency and likelihood of a turbine collision occurring depends on a number of factors. These include aspects of the size and behaviour of a bird species (including their use of a site), the nature of the surrounding environment and the structure and layout of the turbines. Clearly, species that tend to fly above or below RSH are likely to collide less frequently than species that regularly fly at RSH. Collision risk is also likely to be higher for birds that spend much of the time in the air, such as foraging raptors and species that regularly commute between feeding and breeding or roosting grounds (e.g. geese and whooper swans), where this involves frequent flights over a site. The risk of bird collisions at wind farms is also higher in areas where large concentrations of birds are present (e.g. on major migration routes or close to roost sites used by large numbers of birds), and in poor flying conditions, such as strong winds that affect birds' ability to control flight manoeuvres, or in rain, fog and on dark nights when visibility is reduced (Langston & Pullan, 2003⁶⁹; Drewitt & Langston 2006⁷⁰ and references therein). Birds may also be more susceptible if the wind farm is located in an area of high prey density. For diurnal foraging raptors, the proximity of structures on which to perch can also increase the likelihood of collision with turbines (Percival, 2005⁷¹ and references therein).

It should be noted that operational disturbance and collision risk effects are mutually exclusive in a spatial sense, i.e. a bird that avoids the wind farm area due to disturbance cannot be at risk of collision with the turbine rotors at the same time⁷². However, they are not mutually exclusive in a temporal sense; a bird may initially avoid a wind farm but habituate to it, and could then be at risk of collision¹⁹.

Effects during Decommissioning

Turbine removal may cause disturbance to birds breeding, foraging or roosting on Site. The level of impact will depend on the bird species present at the time of decommissioning and cannot be reliably predicted at this stage. However, as decommissioning activities are generally of a similar type and intensity as construction activities, the assessment considers that the potential effects of decommissioning will be similar in nature to the potential effects of construction, with the exception that habitat is likely to be restored and any displaced birds will be able to return to abandoned territories.

8.5.2 Evaluation of Ornithological Features

An evaluation of the importance of each species recorded is provided in Table 8.15. Species evaluated as being of Regional or higher importance are considered to be Important Ornithological Features (IOFs), while those of Local or lower importance are not considered to be IOFs and have been scoped out of the assessment in the following sections.

⁶⁹ Langston, R.H.W. and Pullan, J.D. (2003). *Windfarms and Birds: An Analysis of the Effects of Wind Farms on Birds, and Guidance on Environmental Assessment Criteria and Site Selection Issues*. Report TPVS/Inf. 2003. 12, by BirdLife International to the Council of Europe, Bern Convention on the Conservation of European Wildlife and Natural Habitats. RSPB/BirdLife in the UK.

⁷⁰ Drewitt, A. L. & Langston, R. H. W. (2006). Assessing the impacts of wind farms on birds. *Ibis*, 148: 29-42.

⁷¹ Percival, S. M. 2005. Birds and wind farms: what are the real issues? *British Birds* 98, 194-204.

⁷² Madders, M. & Whitfield, D.P. (2006). Upland raptors and the assessment of wind farm impacts. *Ibis* 148, 43-56.

Table 8.15: Evaluation of Ornithological Features Identified During the Desk Study and/or Baseline Ornithology Surveys

| Importance level | Ornithological feature | Justification |
|----------------------|--|---|
| International | <ul style="list-style-type: none"> • Greylag goose | <p>Non-breeding birds are a cited interest of the Caithness Lochs SPA and Ramsar site. Breeding birds also appear to be a qualifying feature of the Caithness and Sutherland Peatlands Ramsar site, although this is not clear⁴³. Low to moderate levels of flight activity were recorded during all survey years, and small numbers of birds were potentially breeding, and occasionally foraging, within 500 m of the Core Study Area.</p> |
| | <ul style="list-style-type: none"> • Common scoter | <p>Breeding birds are a cited interest of the Caithness and Sutherland Peatlands SPA and also part of the Ramsar site breeding bird assemblage (which is a designated feature). This species was not recorded during any of the Baseline Ornithology Surveys, although the possibility that birds could occasionally fly over the Site at night cannot be excluded. Information relating to confirmed or potential breeding territories is provided in Appendix A8.5.</p> |
| | <ul style="list-style-type: none"> • Red-throated diver • Black-throated diver | <p>Breeding populations of both species are a cited interest of the Caithness and Sutherland Peatlands SPA and also part of the Ramsar site breeding bird assemblage (which is a designated feature). Low levels of red-throated diver flight activity were recorded during all survey years and there were also several incidental records. Levels of black-throated diver activity were lower, with occasional flights recorded in 2015, and single registrations in 2014 and 2018. Information relating to confirmed or potential breeding territories is provided in Appendix A8.5.</p> |
| | <ul style="list-style-type: none"> • Hen harrier | <p>Breeding birds are a cited interest of the Caithness and Sutherland Peatlands SPA and also part of the Ramsar site breeding bird assemblage (which is a designated feature). Low levels of flight activity were recorded during all survey years. Information relating to confirmed or potential breeding territories is provided in Appendix A8.5.</p> |
| | <ul style="list-style-type: none"> • Merlin • Peregrine | <p>Breeding merlin is a cited interest of the Caithness and Sutherland Peatlands SPA and also part of the Ramsar site breeding bird assemblage (which is a designated feature), while breeding peregrine is a cited interest of the North Caithness Cliffs SPA. Low levels of activity by both species were recorded during all survey years. Information relating to confirmed or potential breeding territories is provided in Appendix A8.5.</p> |
| National | No species were evaluated as being present in nationally important numbers. | |
| Regional | <ul style="list-style-type: none"> • Osprey • White-tailed eagle | <p>Neither species is a designated feature of any SPAs with potential connectivity to the Site, but both are listed on Annex I of the Birds Directive³, Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)⁷ and the SBL²⁹. White-tailed eagle is also listed on Schedules 1A and A1 of the Wildlife and Countryside Act 1981 (as amended)⁷ and the UK BoCC Red list²³, while osprey is included on the UK BoCC Amber list²³. Low levels of activity by both species were recorded, with osprey observed in 2015 only, while white-tailed eagle was occasionally recorded during all survey years. However, no evidence of breeding was observed during the Baseline Ornithology Surveys and no historic breeding records within the relevant search areas (2 km for osprey and 6 km for white-tailed eagle) were identified during the Desk Study. It is possible that osprey could</p> |

| Importance level | Ornithological feature | Justification |
|---|---|--|
| | | make more frequent use of the lochs surrounding the Site for foraging in future, while white-tailed eagle could also forage over the Site and surrounding area more frequently in future if it begins breeding in the wider area. |
| | <ul style="list-style-type: none"> • Golden eagle | Breeding birds are a cited interest of the Caithness and Sutherland Peatlands SPA and also part of the Ramsar site breeding bird assemblage (which is a designated feature). There were occasional registrations of this species during the Baseline Ornithology Surveys, but no evidence of breeding within 1.5 km of the Site ⁶⁷ . Information relating to confirmed or potential breeding territories is provided in Appendix A8.5. |
| | <ul style="list-style-type: none"> • Lapwing • Curlew • Snipe | None of these species is a designated feature of any SPAs with potential connectivity to the Site, but lapwing and curlew are Red-listed UK BoCC ²³ identified in NatureScot guidance ³⁴ as priority species for assessment, while snipe is included on the "upland moorland with water bodies" list ⁴² referenced by NatureScot (see Table 8.1) and may therefore be part of the East Halladale SSSI breeding bird assemblage. For all three species, low to moderate levels of flight activity were recorded during all survey years, with all curlew and snipe activity and the majority of lapwing activity recorded during the breeding seasons. All three species bred in low to moderate numbers within or around the Site Area during all survey years. |
| | <ul style="list-style-type: none"> • Golden plover • Dunlin • Greenshank | Breeding populations of all three species are a cited interest of the Caithness and Sutherland Peatlands SPA and are also part of the Ramsar site breeding bird assemblage (which is a designated feature). Low levels of flight activity of all three species were recorded during most or all survey years, and all three were confirmed or potentially breeding in low numbers (1-2 territories per year) within or around the Site during one or more survey years. Information relating to potential greenshank breeding territories is provided in Appendix A8.5. |
| | <ul style="list-style-type: none"> • Arctic tern | The species is not a designated feature of any SPAs with potential connectivity to the Site, but is listed on Annex I of the Birds Directive ³ , the SBL ²⁹ and the UK BoCC Amber list ²³ . Occasional flights were recorded in 2014, with more frequent flight activity recorded in 2018 when a small breeding colony was established within the Moorland Breeding Bird Survey Area. Information relating to confirmed breeding territories is provided in Appendix A8.5. |
| | | <ul style="list-style-type: none"> • Short-eared owl |
| <ul style="list-style-type: none"> • Crossbill species | | Crossbill species are not a designated feature of any SPAs with potential connectivity to the Site, but both crossbill and Scottish crossbill are included on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) ⁷ . Small numbers of crossbill species were recorded during all breeding seasons. These were reported as crossbill. |

| Importance level | Ornithological feature | Justification |
|------------------|---|---|
| | | However, as there are records of Scottish crossbills in the Flow Country of Caithness and Sutherland ⁷³ , and the two species cannot be reliably separated in the field ⁷⁴ , the assessment is based on the potential presence of both species. Information relating to potential breeding territories is provided in Appendix A8.5. |
| Local | <ul style="list-style-type: none"> • Pink-footed goose | An Amber-listed BoCC identified in NatureScot guidance ³⁴ as a priority species for assessment. Low levels of flight activity were recorded during all survey years (up to ten flights per year). However, it is not a designated feature of any SPAs or Ramsar sites with potential connectivity to the Site; therefore, in accordance with NatureScot guidance ⁵⁸ , CRM was not required. There were few records of foraging within 500 m and use of the Site is unlikely to increase following construction. |
| | <ul style="list-style-type: none"> • Greenland white-fronted goose • Whooper swan | Although non-breeding birds are a cited interest of the Caithness Lochs SPA and Ramsar site, the Site is located outwith the core foraging range of both species (5-8 km and <5 km respectively) ³¹ . There were two possible registrations of Greenland white-fronted goose at the adjacent Drum Hollistan development site ⁴⁷ , but it was not recorded during any of the Baseline Ornithology Surveys for the Development. Whooper swan was only recorded during the 2014-15 Baseline Ornithology Surveys, when two flights were recorded (outwith the CRZ). There were also occasional flights of this species during 2014-16 baseline ornithology surveys for the adjacent Drum Hollistan development site ⁴⁷ . However, there was no evidence of regular flight activity over the Core Study Area or any records of foraging within 500 m. It is considered unlikely that use of the Winter Bird Survey Area by either species will increase following construction. |
| | <ul style="list-style-type: none"> • Herring gull (<i>Larus argentatus</i>) | The species is not a designated feature of any SPAs with potential connectivity to the Site, and was therefore not considered to be a target species. As it is identified in NatureScot guidance ³⁴ as a priority species for assessment. The species was regularly recorded in low numbers (fewer than ten birds and typically fewer than five) during the 2018 Flight Activity Surveys, with occasional registrations of larger flocks (13-40 birds). There were also occasional registrations of small numbers of birds (generally fewer than five, with one registration of nine birds) during the 2014-16 Moorland Breeding Bird and Winter Bird Surveys. As such, numbers present were not high and use of the Core Study Area and surroundings is unlikely to increase following construction. |
| | <ul style="list-style-type: none"> • Great skua • Arctic skua | Neither species is a designated feature of any SPAs with potential connectivity to the Site. Both species are identified in NatureScot guidance ³⁴ as a priority species for assessment, and included on the "upland moorland with water bodies" list ⁴² referenced by NatureScot (see Table 8.1) and may therefore be part of the East Halladale SSSI breeding bird assemblage. Great skua is also included on the UK BoCC Amber list ²³ , while Arctic skua is included on the SBL ²⁹ and UK BoCC Red list ²³ . |

⁷³ Summers, R.W. & Piartney, S.B. (2003). The Scottish Crossbill – what we know and what we don't. *British Birds* 96, 100-111.

⁷⁴ Summers, R.W., Dawson, R.G.J. & Phillips, R.E. (2007). Assortative mating and patterns of inheritance indicate that the three crossbill taxa in Scotland are species. *Journal of Avian Biology* 38, 153-162.

| Importance level | Ornithological feature | Justification |
|---|---|---|
| | | <p>There were four great skua flights in 2014 and a single flight in 2018, as well as occasional incidental records. Arctic skua was not recorded during Baseline Ornithology Surveys, but a single record was identified during the Desk Study and there were occasional registrations of both species during surveys for the adjacent Drum Hollistan development site⁴⁷.</p> <p>However, no evidence of breeding was observed and no historic breeding records of either species within 2 km of the Site were identified during the Desk Study and it is considered unlikely that use of the Core Study Area and surrounding area by either species will increase post-construction.</p> |
| | <ul style="list-style-type: none"> • Teal • Goldeneye • Red grouse • Buzzard • Oystercatcher • Ringed plover • Common sandpiper • Common gull • Cuckoo • Upland breeding passerines (raven, stonechat and wheatear) | <p>Species of low to moderate conservation concern which are included on the "upland moorland with water bodies" list⁴² referenced by NatureScot (see Table 8.1) and may therefore be part of the East Halladale SSSI breeding bird assemblage, but are not designated features of any SPAs with potential connectivity to the Site, or identified in NatureScot guidance³⁴ as a priority species for assessment. These species were generally recorded in low numbers and it is considered unlikely that the Development would have a significant impact on local populations.</p> |
| | <ul style="list-style-type: none"> • Other Red- and Amber-listed BoCC | <p>Species of conservation concern that are not designated features of any SPAs with potential connectivity to the Site, not included on Schedule 1⁷/Annex I³ or the "upland moorland with water bodies" list⁴² referenced by NatureScot (see Table 8.1) and not identified in NatureScot guidance³⁴ as a priority species for assessment. These species are generally considered as being at low risk from wind farm developments and it is considered unlikely that the Development would have a significant impact on local populations.</p> |
| Less than Local | <ul style="list-style-type: none"> • All species not covered above (e.g. grey heron and other species listed on the UK BoCC Green list²³) | <p>Species that are generally common and widespread and of low conservation concern and which are considered as being at low risk from wind farm developments.</p> |
| <p>*Note that good practice will be implemented during construction to protect all nesting birds (see Section 8.3.10.1), including species scoped out of the assessment</p> | | |

8.5.3 Assessment of IOFs

Potential effects of the Development on each IOF are assessed below, with IOFs considered in order of importance level (and by BOU taxonomic order¹ within each importance category). To minimise repetition, where potential effects are likely to be similar, related species with broadly similar behaviour and ecology are discussed together rather than separately (although individual effects are considered separately where these are expected to differ).

The assessment considers the significance of potential effects following implementation of the embedded mitigation proposed in Section 8.3.10.

8.5.3.1 Species of International Importance

Greylag Goose

Contextual information: Greylag goose is included on the UK BoCC Amber list due to the localisation of the wintering population²³. Non-breeding greylag goose is a qualifying interest of the Caithness Lochs SPA and Ramsar site. Breeding greylag goose also appears to be a qualifying interest of the Ramsar site of the Caithness and Sutherland Peatlands Ramsar site⁴⁴ but the RIS⁴³ does not provide the size of the breeding population. Two greylag goose breeding populations are currently recognised in the UK: (i) the north-west Scotland (native) population, which is the remnant of the population that once occurred more widely across Britain; and (ii) the re-established population of birds released between the 1930s and 1960s. The abundance and distribution of both populations have recently increased, to the extent that they can no longer be considered to be objectively separable, and it has therefore been proposed that that, for conservation management purposes, counts and estimates of the population size of the two populations should be merged to form a single British breeding population⁷⁵. After the breeding season, these birds are joined by 85,000+ immigrants from Iceland that winter in lowland areas^{25,75}.

In Sutherland, greylag goose is a common and increasing breeding resident, and birds from the Icelandic breeding population commonly occur on passage and in winter³⁸. Similarly, the species is a regular breeding species, passage migrant and winter visitor in Caithness, which constitutes a major staging/wintering area, with the total aggregation of flocks surpassing 10,000 individuals²². The most recent population estimate for the Caithness Lochs SPA is 10,488 individuals⁷⁶ and the latest assessed condition of this population (in 2015) was 'favourable maintained'⁷⁷.

Baseline summary: Low to moderate levels of flight activity were recorded during all survey years, peaking at 34 flights in 2015-16. Across all survey years, flock size was relatively low, with a maximum flock size of 49 individuals (Table 8.10). There were also four registrations of this species during the Winter Walkover Surveys, the majority of which were in the fields within and adjacent to the western boundary of the Site, close to Halladale Bridge. Numbers were again relatively low, peaking at 54 birds during the 2014-15 surveys and 22 in 2015-16. Although RPS did not record whether birds were foraging, this is considered likely. As summarised in Table 8.13, there were also several incidental registrations of greylag goose during both the 2014 and 2015 breeding seasons. It is considered likely that a pair bred within or just outwith the north-western tip of the Site in all survey years, and two additional pairs may have bred to the east and south-west of the Site in 2015. All breeding territories were more than 500 m from the

⁷⁵ Mitchell, C., Hearn, R. & Stroud, D. (2012). The merging of populations of Greylag Geese breeding in Britain. *British Birds* 105, 498–505.

⁷⁶ Mitchell, C. (2015). *Status and distribution of Icelandic-breeding geese: results of the 2014 international census*. Wildfowl & Wetlands Trust Report, Slimbridge. 19pp.

⁷⁷ SNH (2020). SiteLink. <https://sitelink.nature.scot/site/8477> (Accessed 27/08/2020).

turbines and associated infrastructure. It is considered unlikely that use of this area by breeding or foraging birds will increase in future.

Potential construction effects: Land-take during construction will not include any of the areas where foraging and (potentially) breeding birds were recorded; therefore, direct habitat loss is highly unlikely to have any effects on greylag goose populations.

The Site is not located within the core foraging areas used by qualifying species of the Caithness Lochs SPA⁷⁸. Furthermore, there were only very occasional records of relatively low numbers of foraging greylag geese within 500 m of the Core Study Area during the Winter Bird Surveys, indicating that birds do not make regular use of this area for foraging. It was likely that small numbers (1-3 pairs) were breeding during all survey years, but all breeding territories were located more than 500 m from turbines and associated infrastructure.

Although there may be occasional disturbance of small numbers of foraging birds during construction, this will be temporary, and the fields in the wider area, including along the Halladale River, will provide suitable alternative feeding habitat for any birds that are temporarily displaced. Similarly, based on survey results, it is possible that a single breeding pair in the north-west of the Site could be disturbed, although this is considered unlikely given that this was more than 500 m from turbines and associated infrastructure. Furthermore, relevant good practice measures described in Section 8.3.10.1 will be applied during construction to ensure compliance with legislation protecting all breeding birds.

As such, potential construction phase effects on the Caithness Lochs SPA and Ramsar site wintering greylag goose population, which is considered to be an IOF of international importance, are assessed as being of low magnitude and **not significant**. No adverse effect on the integrity of the SPA and Ramsar site is predicted.

Potential operation effects: As noted above, use of the Winter Bird Survey Area by foraging greylag geese appears to be limited to occasional use by relatively low numbers of birds. Similarly, during the breeding season, pairs selected areas outwith the Site. As such, the risk of disturbance to greylag geese during the operational phase is considered to be of low magnitude.

Based on the 2015-16 data, the CRM predicted an annual collision risk of 0.039 greylag geese or one collision every 25.641 years⁷⁹. The predicted collision risk based on the 2015-16 non-breeding season data was 0.017 birds, while the mean breeding season collision risk for 2015 and 2018 was 0.019 birds. A total annual collision risk of 0.039 birds would represent <0.001% of the Caithness Lochs SPA population (10,488 birds⁷⁶). Clearly this would not affect the condition of the population, which was most recently assessed as 'favourable maintained'.

As such, potential operational phase effects on the Caithness Lochs SPA and Ramsar site greylag goose populations, which are considered to be an IOF of international importance, are assessed as being of negligible magnitude and **not significant**. No adverse effect on the integrity of the SPA and Ramsar site is predicted.

Potential decommissioning effects: These are likely to be of the same nature as construction effects. Therefore, potential effects during decommissioning on greylag goose, which is considered to be an IOF of international importance, are assessed as

⁷⁸ Patterson, I.J., Lambie, D., Smith, J. & Smith, R. 2013. *Survey of the feeding areas, roosts and flight activity of qualifying species of the Caithness Lochs Special Protection Area, 2011/12 and 2012/13*. Scottish Natural Heritage Commissioned Report No. 523b.

⁷⁹ It is acknowledged that a collision of <1 of a bird is not possible; therefore, such values are interpreted as a single bird likely to be killed in some years but not others (hence the reporting of collision frequency).

being of low magnitude and **not significant**. No negative effect on the integrity of the SPA and Ramsar site is predicted.

Common Scoter

Contextual information: Common scoter is listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)⁷ and the SBL²⁹. It is also included on the UK BoCC Red list due to severe declines in both the breeding population and breeding range²³. The species is a scarce breeder in Scotland, which is at the southern end of its global range, and in winter occurs around most Scottish coasts²⁵. The Scottish breeding population is small at an estimated 52 pairs⁹¹, while the wintering population is estimated at 25,000-30,000 birds²⁵. A small common scoter breeding population is present in the Flow Country of Caithness and Sutherland, and the species is also a regular passage migrant and winter visitor in the region^{38,22}. In Sutherland, non-breeding birds are most numerous in the south-east, and birds are rarely present in the north and west³⁸. Breeding common scoter is a qualifying interest of the Caithness and Sutherland Peatlands SPA and is also listed as part of the breeding bird assemblage for which the Ramsar site is partly designated⁴³. The breeding population is estimated at 26 pairs³⁷ and the latest assessed condition was 'unfavourable, declining' in 2013⁹³. According to Symonds & Vittery (2018)³⁸, however, the status of the Flow Country breeding population remains unchanged.

Baseline summary: The species was not recorded during any of the Baseline Ornithology Surveys and all breeding records identified during the Desk Study were located more than 2 km from the Site. However, there was an incidental record of common scoter (further details are provided in Appendix A8.5), and it is possible that birds could breed within 500 m⁶⁷ of the Site in future.

Potential construction effects: There will be no direct loss of any suitable nesting habitat for common scoter. There is some suitable breeding habitat within 500 m⁶⁷ of the turbines and associated infrastructure, and it is possible that birds could breed there in future. Relevant good practice measures described in Section 8.3.10.1 will be applied during construction to ensure compliance with legislation protecting all breeding birds. However, in the absence of specific mitigation measures, there is some potential for breeding common scoter to be disturbed.

As such, in the absence of specific mitigation measures, potential construction phase effects on the Caithness and Sutherland Peatlands SPA and Ramsar site breeding common scoter population, which is considered to be an IOF of international importance, are assessed as being of high magnitude and an adverse effect on the integrity of the SPA and Ramsar site is possible. Specific mitigation measures are therefore proposed for this species, as detailed in Appendix A8.5.

Potential operation effects: as noted above, the habitat within 500 m⁶⁷ of the Development has some potential to support breeding common scoter, and it is possible that birds could breed in the area in future, although any birds doing so would be selecting nest sites regardless of the presence of operational turbines. In addition, it is expected that the level of human activity on Site during operational works will be infrequent and of limited extent (both spatially and temporally). Furthermore, where any major works are required during the operational phase, relevant good practice measures described in Section 8.3.10.1 will be applied to ensure compliance with legislation protecting breeding birds.

No common scoter flights were recorded during a total of 468 hours of breeding season (March to August) Flight Activity Surveys and 191.5 hours of Focal Loch Watches (across all survey years), or any other Baseline Ornithology Surveys. However, the RSPB highlighted concerns that birds migrating to breeding sites at night could be at risk of collision.

It is not clear how far birds breeding in Scotland move during the winter. However, the presence of both moulting flocks soon after the breeding season (such as those regularly reported at traditional sites on the east coast of Scotland) and birds at UK coastal sites throughout the winter, suggests that the Scottish breeding population winters around the UK coast⁸⁰. The migration route of the Scottish breeding population is unknown. The majority of breeding common scoter records identified (detailed in Appendix A8.5) are located to the south-east of the Development. Therefore, if breeding birds do originate from coastal locations around the UK, based on the distribution of non-breeding birds along the north coast of Scotland, which are largely present to the east of the Development⁸¹, it seems very unlikely that birds would migrate across the Site. This is supported by the paucity of BTO records of non-breeding birds in the NC86 and NC96 grid squares to the north and north-west of the Site (Table 8.9). Similarly, if birds originate from elsewhere in their wintering range in the Baltic Sea, off the Atlantic coast of Europe and North Africa, south to Mauritania, and in the western Mediterranean⁸², it appears unlikely that birds would fly over the Development to reach their breeding sites.

Furthermore, recent tracking study involving four female common scoters tagged with geo-locators at breeding lochs in the western Highlands showed large variation in routes followed at the end of the breeding season. One of the females travelled a short distance to the Moray Firth, two birds flew south-west to completely different locations in the Irish Sea, and the fourth bird flew hundreds of miles south to the coast of Morocco⁸³. This suggests that birds may not all follow the same flight paths between breeding and wintering sites, which would likely reduce the likelihood of a substantial proportion of the Flow Country breeding population flying over the Site.

Similar concerns were raised by the RSPB regarding potential effects of Beinneun Wind Farm (which is now operational) on the West Inverness-Shire Lochs SPA's breeding common scoter population, although this was largely in relation to collision risk to birds moving between breeding lochs within the SPA. As part of the ES for Beinneun Wind Farm a common scoter appraisal was produced⁸⁴, which included consultations with technical experts and a literature review pertaining to the response of common scoters to offshore wind farms.

The literature review found that, during the day, common scoters strongly avoid offshore wind farms, with most birds changing flight direction a considerable distance away from a wind farm to fly around it, while the small number of birds that come close to offshore wind turbines fly between rows to avoid collision risk. It was also found that common scoters reduce flight activity when visibility is poor and in very dark conditions, but that birds flying at night still showed strong avoidance of offshore wind farms. Although it is expected that flight behaviour may differ between non-breeding birds flying offshore during the day and birds migrating overland at night, it is still expected that birds may show avoidance of onshore turbines. Similarly, a more recent Technical Note submitted as part of the SEI for the (refused) Drum Hollistan 2 Wind Farm⁸⁵ concluded that

⁸⁰ Wernham, C., Toms, M., Marchant, J., Clark, J., Siriwardena, G. & Baillie, S. (2002). *The Migration Atlas: Movements of the Birds of Britain and Ireland*. T. & A.D. Poyser Ltd.

⁸¹ Balmer, D.E., Gillings, S., Caffrey, B., Swann, R.L., Downie, I.S. & Fuller, R.J. (2013). *Bird Atlas 2007-11: the breeding and wintering birds of Britain and Ireland*. BTO Books, Thetford.

⁸² BirdLife International (2020) Species factsheet: *Melanitta nigra*. [Online] Available at: <http://datazone.birdlife.org/species/factsheet/common-scoter-melanitta-nigra> (Accessed 27/08/2020).

⁸³ McNeill, C. (2015). Endangered breeding duck's flight path revealed for first time. *The Herald*. [Online] Available at: <https://www.heraldscotland.com/news/13502574.endangered-breeding-ducks-flight-path-revealed-for-first-time/> (Accessed 04/11/2020).

⁸⁴ Ridgewind Ltd (2011). *Beinneun Windfarm Appraisal of the Likely Significant Effect on Common Scoter Associated with the West Inverness-Shire Lochs Special Protection Area*. Beinneun Windfarm Environmental Statement, Appendix A8.2.

⁸⁵ Natural Research Projects Limited (2020). *Appendix 12.6 Technical Note – Response to RSPB consultation response (17th April 2020)*. Drum Hollistan 2 Wind Farm. Supplementary Environmental Information.

numerous studies found that common scoter was almost completely displaced from offshore wind farms, suggesting that birds are likely to display macro-avoidance behaviour (i.e. will avoid entering a wind farm site), and are therefore unlikely to be at high risk of collision with turbines.

The Beinneun Wind Farm literature review also found that, offshore, common scoters fly at very low heights, and rarely at turbine blade height, and that birds flying through offshore wind farms always flew below blade height. This is supported by a more recent review by Cook *et al.* (2012)⁸⁶, who found that, based on a turbine with an RSH of 20-150 m and using a dataset of 30,847 birds recorded at 18 offshore sites, only 1% of flights would be at PCH. Expert opinions included anecdotal evidence that birds typically flew very low to the ground around breeding lochs. However, a Danish study was also cited in the review, which found that, when nocturnally migrating common scoter cross land, they usually do so at high altitude⁸⁷. This is supported by Madge & Burn (1988)⁸⁸ who report that common scoter typically migrate low over water but very high when flying over land. In addition, a study by Kahlert *et al.* (2012)⁸⁹ on the flight altitude of migrating waterbirds, including common scoter, found that mean flight altitude was significantly higher at night (425 m) compared with during the day. These studies indicate that common scoter are unlikely to regularly fly at PCH, particularly during nocturnal migration.

Given the common scoter winter distribution and Scottish breeding range combined with the relatively small size of both the breeding population and the Development, and high levels of turbine avoidance, it is considered highly unlikely that there will be a significant risk of collision to nocturnally migrating common scoter.

During consultation, the RSPB also stated that common scoters are known to feed at sea during the breeding season (Table 8.1). Common scoter feed mainly on molluscs, but in breeding lochs, their diet includes other invertebrates, some seeds and plant tubers²⁵. Research by the RSPB on the Flow Country population found that preferred breeding lochans are characterised by a greater abundance of large-bodied aquatic invertebrates, which are typical prey items, and larger areas of shallow water, which may make foraging easier for common scoters⁹⁰. No publications detailing foraging at sea by breeding birds were identified. However, during correspondence in relation to another development site, the RSPB stated that there is anecdotal evidence of common scoter feeding at sea in Iceland, where they nest close to the coast, although it was acknowledged that this was less likely to occur in Scotland due to the greater distance between nest sites and the coast (Bea Ayling *pers. comm.*). It was further noted that common scoters in the Flow Country can take "1-3 hour recesses", which would allow birds sufficient time to feed at the coast. However, there is no evidence that this does occur. It is not clear whether the reports of foraging at sea occurred during the day or at night, but it is expected that any regular diurnal foraging flights to the coast would have been detected during the Baseline Ornithology Surveys. As noted above, birds could breed within 500 m⁶⁷ of the Site in future, which may result in flights across the Site if birds forage at the coast. However, as detailed above, there is evidence that common scoters show strong avoidance of turbines. If birds are foraging at the coast at night, it is acknowledged that they could be

⁸⁶ Cook, A.S.C.P., Johnston, A., Wright, L.J. & Burton, N.H.K. (2012). *A review of flight heights and avoidance rates of birds in relation to offshore wind farms*. (Report No. 618). Report by British Trust for Ornithology (BTO). Report for The Crown Estate.

⁸⁷ Pedersen, M.B. (1988). Spring migration of common scoters across Southwest Jutland. *Dansk Ornitologisk Tidsskrift* 82, 51-53.

⁸⁸ Madge, S. & Burn, H. (1988). *Wildfowl*. Christopher Helm Ltd., London.

⁸⁹ Kahlert, J., Leito, A., Laubek, B., Luigujoe, L., Kuresoo, A., Aaen, K. & Luud, A. (2012). Factors affecting the flight altitude of migrating waterbirds in Western Estonia. *Ornis Fennica* 89, 241-253.

⁹⁰ RSPB (Undated). *Causes of common scoter decline*. <http://ww2.rspb.org.uk/our-work/conservation/conservation-projects/details/239777-the-ecology-of-breeding-common-scoters> (Accessed 27/08/2020)

at risk of collision. However, it is likely that the numbers of birds involved would be very low. Given this, the relatively small size of the Development, and high levels of turbine avoidance exhibited by common scoter, it is considered highly unlikely that there will be a significant risk of collision to breeding birds if they do forage at the coast.

As such, potential operational phase effects on the Caithness and Sutherland Peatlands SPA and Ramsar site breeding common scoter population, which is considered to be an IOF of international importance, are assessed as being of low magnitude and **not significant**. No adverse effect on the integrity of the SPA and Ramsar site is predicted.

Potential decommissioning effects: These are likely to be of the same nature as construction effects. Therefore, in the absence of specific mitigation measures, potential effects during decommissioning on the Caithness and Sutherland Peatlands SPA and Ramsar site breeding common scoter population, which is considered to be an IOF of international importance, are assessed as being of high magnitude and an adverse effect on the integrity of the SPA and Ramsar site is possible. Specific mitigation measures are therefore proposed for this species, as detailed in Appendix A8.5.

Diver Species

Contextual information: Both red-throated and black-throated diver are included on Schedule 1⁷, Annex I³ and the SBL. Black-throated diver is also included on the UK BoCC Amber list due to the rarity of both the breeding and non-breeding populations²³. Breeding populations of both species are a cited interest of the Caithness and Sutherland Peatlands SPA and also part of the Ramsar site breeding bird assemblage (which is a designated feature)⁴³.

Scotland is at the extreme southern end of the red-throated diver breeding range. It breeds on fresh water, often on remote moorland, in the north and west of Scotland²⁵. The Scottish breeding population is estimated at 1,300 pairs⁹¹. In winter, red-throated diver is distributed around most of the Scottish coast; the Scottish wintering population is estimated at over 2,270 birds and comprises a mixture of Scottish breeders and immigrants from more northerly breeding populations²⁵. In Sutherland, the breeding red-throated diver population is widespread and appears to be stable; it is also a common winter resident on coasts (particularly in the south-east)³⁸. The species is also a regular breeding bird, passage migrant and winter visitor in Caithness, although productivity is generally very poor²². The NHZ 5 population has been estimated at 58 breeding pairs³⁹, while the Caithness and Sutherland Peatlands SPA population is estimated at 46 pairs⁹² and the latest assessed condition (in 2006) was 'favourable maintained'⁹³.

Black-throated diver is a scarce breeding species on freshwater lochs in the north and west of Scotland²⁵. The Scottish breeding population is estimated at 220 pairs²⁵. The Scottish wintering population is estimated at 700-800 birds and may include immigrants from Fennoscandia; non-breeding birds utilise inshore coastal waters²⁵. The species is a regular breeding bird, passage migrant and winter visitor in Caithness; although numbers of breeding birds are low, there is some evidence of a small increase in recent years²². Breeding success of black-throated divers in Sutherland has almost doubled where artificial nest rafts have been provided, which is likely to increase the breeding population³⁸. The NHZ 5 population has been estimated at 39 breeding pairs³⁹, while the Caithness and Sutherland Peatlands SPA population is estimated at a minimum of 20 pairs³⁷ and the latest assessed condition (in 2018) was 'favourable maintained'.

⁹¹ Musgrove, A., Aebischer, N., Eaton, M., Hearn, R., Newson, S., Noble, D., Parsons, M., Risely, K. & Stroud, D. (2013). Population estimates of birds in Great Britain and the United Kingdom. *British Birds* 106, 64–100.

⁹² Joint Nature Conservation Committee (2018). Natura 2000 – Standard Data Form: Site UK9001151, Caithness and Sutherland Peatlands SPA. Available online at: <https://sitelink.nature.scot/site/8476> (Accessed 27/08/2020).

⁹³ SNH (2020) SiteLink. <https://sitelink.nature.scot/site/8476> (Accessed 27/08/2020).

Baseline summary: Relatively low levels of red-throated diver flight activity were recorded during all survey years (Table 8.10). Although additional flights were recorded during the Focal Loch Watches, with the exception of two flights in 2018, all were outwith the Site Boundary (further details are provided in Appendix A8.5). There were also several incidental records of this species during the 2014 and 2015 breeding seasons and red-throated divers bred within the Breeding Diver Survey Area during all survey years, although there were no confirmed breeding territories within 750 m⁶⁷ of the turbines or associated infrastructure. An additional, historic territory within the Breeding Diver Survey Area was also identified during the Desk Study, but was not confirmed to be active.

Black-throated diver was recorded less frequently, with five flights of during the 2015 breeding season Flight Activity Surveys and a single registration of a non-breeding black-throated diver during the 2018 Focal Loch Watches. No evidence of breeding was observed, but breeding records within the Desk Study Search Area were identified during the Desk Study.

Further details of all confirmed and potential breeding territories of both species are provided in Appendix A8.5. It is considered likely that both species will breed in the wider area in future and, as noted above, it is possible that the regional black-throated diver breeding population could increase.

Potential construction effects: Due to the lack of suitable habitat on Site, neither diver species will lose any breeding or foraging habitat due to construction of the Development.

In addition, as all confirmed red-throated diver breeding territories recorded during the Baseline Ornithology Surveys, as well as all black-throated diver territories identified during the Desk Study, were over 750 m⁶⁷ away from the turbines and associated infrastructure, it is considered unlikely that birds breeding in the same locations will be disturbed during the construction phase. Although it is possible that birds could breed at other sites within 750 m⁶⁷ in future, relevant good practice measures described in Section 8.3.10.1 will be applied during construction to ensure that breeding birds are not disturbed.

As such, potential construction phase effects on the Caithness and Sutherland Peatlands SPA and Ramsar site breeding red-throated and black-throated diver populations, both of which are considered to be IOFs of international importance, are assessed as being of low magnitude and **not significant**. No adverse effects on the integrity of the SPA and Ramsar site are predicted.

Potential operation effects: As no confirmed breeding red-throated or black-throated diver territories were recorded within 750 m⁶⁷ of the turbines or associated infrastructure, birds breeding in the same locations in future will not be disturbed during the operational phase. Although suitable breeding habitat is present within this area and it is possible that divers could breed there in future, birds would be choosing to use the Site regardless of the presence of operational turbines. Moreover, it is expected that the level of human activity on Site during operational works will be infrequent and of limited extent (both spatially and temporally). Where any major works are required during the operational phase, relevant good practice measures described in Section 8.3.10.1 will be applied to ensure compliance with legislation protecting breeding Schedule 1 birds such as red-throated diver.

The predicted breeding season collision risk ranged from 0.015 birds in 2014 to 0.006 in 2018, with a predicted a mean breeding season risk of 0.008 red-throated divers, or one collision every 125.0 years⁷⁹; as birds are unlikely to occur inland during the non-breeding season, breeding season values are considered to be representative of the annual collision risk. An annual collision risk of 0.008 birds would represent 0.009% of the Caithness and Sutherland Peatlands SPA population (92 birds⁹²). This is highly unlikely to affect the condition of the population, which was most recently assessed as 'favourable

maintained'. As detailed in Table 8.5, due to limited flight activity, CRM was not completed for black-throated diver during any survey year.

Although it is possible that both diver species could breed closer to the turbines in future, which in theory could increase collision risk, there is evidence to suggest that red-throated diver demonstrates very high rates of turbine avoidance, both onshore and offshore, and the risk of collision to both diver species is considered to be very low⁹⁴. It is expected that increased black-throated diver flight activity in the area would result in similar levels of collision risk to that of red-throated diver.

Breeding red-throated divers typically fly to the sea to forage²⁵, and breeding black-throated divers can also forage at sea³³; both species may also forage at lochs (away from breeding lochs). The Development could therefore result in a barrier effect to any birds breeding to the east or south of the Site, with birds flying around rather than through the Development ('macro-avoidance'). A study of red-throated divers breeding around a wind farm on the island of Smøla in Norway⁹⁵ found evidence of strong macro-avoidance, with no flights observed through the turbine during just over 46 hours of surveys in May and June. However, Furness (2015) notes that red-throated diver flight activity is generally very low in May and June because birds are incubating, and cites a study by Upton (2012)⁹⁶ which reported frequent red-throated diver flights between turbines at Bugar Hill Wind Farm on Orkney. As a closely-related species to red-throated diver, with similar flight characteristics and behaviour⁹⁴, black-throated diver is also assumed to show strong turbine avoidance⁵⁹.

If red-throated and/or black-throated divers avoid flying through the Development, it is considered likely that any birds breeding at sites to the east of the Development would be able to follow a relatively direct flight path around the eastern edge of the Site to reach the coast. Any birds breeding at sites to the south may instead fly around the western side of the Development, but would still be able to follow a relatively straight flight path to reach the coast. It is considered that the additional distance required to fly around the Development rather than through it will be minor and unlikely to result in significant increases to daily energy costs.

As such, potential operational effects on Caithness and Sutherland Peatlands SPA and Ramsar site breeding red-throated and black-throated diver populations, both of which are considered to be IOFs of international importance, are assessed as being of low magnitude and **not significant**. No adverse effects on the integrity of the SPA and Ramsar site are predicted.

Potential decommissioning effects: These are likely to be of the same nature as construction effects. Therefore, potential effects during decommissioning on red-throated and black-throated diver, both of which are considered to be IOFs of international importance, are assessed as being of low magnitude and **no significant** effects are predicted for either species. No adverse effects on the integrity of the SPA and Ramsar site are predicted.

Hen Harrier

Contextual information: Hen harrier is included on Annex I of the Birds Directive³, Schedules 1 and 1A of the Wildlife and Countryside Act 1981 (as amended)⁷ and the SBL²⁹. It is also Red-listed due to a historical decline in the UK breeding population²³.

⁹⁴ Furness, R.W. (2015). *A review of red-throated diver and great skua avoidance rates at onshore wind farms in Scotland*. Scottish Natural Heritage Commissioned Report No. 885.

⁹⁵ Halley, D.; Hopshaug, P. (2007). *Breeding and Overland Flight of Red-throated Divers (Gavia stellata) at Smøla, Norway, in relation to the Smøla wind farm* (Report No. 297). Report by Norwegian Institute for Nature Research (NINA).

⁹⁶ Upton, A. (2012). *Red-throated diver wind turbine avoidance, Bugar Hill, Orkney: 2007-2012*. Firth Ecology, Finstown.

With an estimated Scottish population of 460 breeding pairs⁹⁷, hen harrier is a widespread but generally scarce breeding species, found mostly in upland areas²⁵. Persecution of this species across Scotland is well documented and remains severe in certain areas⁹⁷. During the autumn and winter many Scottish birds move to lower altitudes, where they hunt over open habitats²⁵.

The breeding hen harrier population in NHZ 5 is low at an estimated at 38 pairs³⁹. Breeding birds are a qualifying interest of the Caithness and Sutherland Peatlands SPA and are also a component of the Ramsar site breeding bird assemblage (which is a designated feature)⁴³. Davey *et al.* (2015)²² estimated that the Caithness breeding hen harrier population may comprise 25-30 nesting females, while Symonds & Vittery³⁸ estimate that the breeding population in Sutherland comprises approximately 30 pairs. However, the SPA breeding population was estimated at 13 pairs in 2016³⁷ and the latest assessed condition (in 2016) was 'favourable'⁹³. In 2018, six hen harrier territories occupied by pairs were reported by Scottish raptor workers in Sutherland (no territories were checked in Caithness)²⁰.

Baseline summary: Relatively low levels of hen harrier flight activity (6-10 flights) were recorded during all survey years. There were also a small number of hen harrier registrations during Breeding Raptor Surveys in all survey years, as well as three observations during the 2015 Moorland Breeding Bird Survey. Details of potential breeding territories are provided in Appendix A8.5. Hen harrier was also occasionally recorded during the non-breeding season, but no evidence of roosting was recorded.

Potential construction effects: Although potentially suitable habitat for breeding, foraging and roosting hen harrier could be lost, the extent will be very small. Furthermore, the low level of year-round activity indicates that the Site is not of high value to hen harrier; the habitat in the wider area, notably in the adjacent Caithness and Sutherland Peatlands SPA, may be more optimal for this species.

Although there is some potential for foraging birds to be disturbed, as noted above, levels of hen harrier activity were low, indicating that the Core Study Area and surroundings are used only occasionally by foraging birds. Furthermore, disturbance to foraging birds will be temporary, and suitable alternative foraging habitat is available in the wider area for any birds that are temporarily displaced. A single potential breeding territory was identified within the Breeding Raptor Survey Area. The good practice measures described in Section 8.3.10.1 will be applied during construction to ensure compliance with legislation protecting all breeding and roosting birds. However, in the absence of specific mitigation measures, there is some potential for breeding hen harriers to be disturbed.

As such, in the absence of specific mitigation measures, potential construction phase effects on the Caithness and Sutherland Peatlands SPA and Ramsar site breeding hen harrier population, which is considered to be an IOF of international importance, are assessed as being of high magnitude and an adverse effect on the integrity of the SPA and Ramsar site is possible. Specific mitigation measures are therefore proposed for this species, as detailed in Appendix A8.5.

Potential operation effects: As noted above, no confirmed breeding territories were identified and no evidence of roosting was observed. Although it is possible that birds will breed or roost within the Site or surrounding area in future, which could increase the potential for them to be disturbed, although this is considered highly unlikely as the birds would be choosing to use the Site regardless of the presence of operational turbines. Furthermore, it is expected that the level of human activity on Site during operational works will be infrequent and of limited extent (both spatially and temporally). Where any major works are required during the operational phase, relevant good practice measures

⁹⁷Wotton, S.R., Bladwell, S., Mattingley, M., Morris, N.G., Raw, D., Ruddock, M., Stevenson, A. & Eaton, M.A. (2018). Status of the Hen Harrier *Circus cyaneus* in the UK and Isle of Man in 2016. *Bird Study* 65, 145-160.

described in Section 8.3.10.1 will be applied to ensure compliance with legislation protecting breeding and roosting hen harrier.

Although reported collision rates for hen harrier at European wind farms are low at just 14 incidents⁹⁸, seven of these were in the UK and Ireland^{98,99,100}, with four at Griffin Wind Farm¹⁰¹. This suggests that, while the majority of onshore wind farms in the UK pose a low collision risk to hen harriers, some may be problematic. Furthermore, the scale of hen harrier persecution, which is a major threat to populations in some parts of the UK⁹⁷, means that other pressures such as collision risk could have a disproportionately high effect. The reasons for the high incidence of hen harrier collisions at Griffin Wind Farm are unknown, but with so few hen harrier collisions reported elsewhere in Europe, it appears to be an exceptional case. Unlike the Development, the Griffin Wind Farm site had previously been forestry that was felled prior to construction, and with 68 turbines, the scale of Griffin Wind Farm is much larger than the Development. The CRM predicted that there would be 0.002 hen harrier collisions per year based on the 2015-16 data, or one collision every 255.943 years⁷⁹. The mean breeding season risk was 0.005 birds, which would represent 0.019% of the Caithness and Sutherland Peatlands SPA and Ramsar site population (26 birds³⁷), the condition of which, was most recently assessed as 'favourable maintained'.

As noted in Section 8.3.6.1, there was a gap in VP viewshed coverage of the airspace below approximately 20 m above the ground⁵⁰ and it is acknowledged that there could have been some undetected hen harrier flights at PCH within this gap. However, given the narrow height band and limited area, it is anticipated that levels of undetected flight activity at PCH would be low (particularly as no active or historic breeding hen harrier territories were identified within 500 m of the turbines). As such, it is considered unlikely that any undetected flights would increase collision risk to such an extent that there could be a significant effect on the SPA breeding population. Although it is also possible that Site use by breeding and/or foraging birds could increase post-construction due to the habitat enhancements outlined in in **Chapter 7: Ecology**, these areas will be located more than 500 m from turbines and it is considered unlikely that there would be more than a minor increase in collision risk.

As such, potential operational phase effects on the Caithness and Sutherland Peatlands SPA and Ramsar breeding hen harrier population, which is considered to be an IOF of international importance, are assessed as being of low magnitude and **not significant**. No adverse effect on the integrity of the SPA and Ramsar site is predicted.

Potential decommissioning effects: These are likely to be of the same nature as construction effects. Therefore, in the absence of specific mitigation measures, potential effects during decommissioning on the Caithness and Sutherland Peatlands SPA and Ramsar site breeding hen harrier population, which is considered to be an IOF of international importance, are assessed as being of high magnitude and an adverse effect on the integrity of the SPA and Ramsar site is possible. Specific mitigation measures are therefore proposed for this species, as detailed in Appendix A8.5.

⁹⁸ Dürr, T. (2019). *Vogelverluste an Windenergieanlagen / Bird fatalities at wind turbines in Europe*; Daten aus der zentralen Fundkartei der Staatlichen Vogelschutzwarte im Landesamt für Umwelt Brandenburg zusammengestellt: Tobias Dürr; Stand vom: 07 January 2020 [Online] Available at: <http://www.lfu.brandenburg.de/cms/detail.php/bb1.c.312579.de> (Accessed 27/08/20).

⁹⁹ Green News (2019) Hen Harrier [Online] Available at: <https://greennews.ie/hen-harrier-wind-turbine/> (Accessed 27/08/20)

¹⁰⁰ Scott, D. & McHaffie, P. 2008. Hen Harrier *Circus cyaneus* killed at windfarm site in County Antrim. *Irish Birds* 8, 436-437.

¹⁰¹ RSPB (2016). *Raptor Windfarm Deaths* published online at: <https://community.rspb.org.uk/ourwork/b/scotland/posts/raptor-windfarm-deaths> (Accessed 27/08/20).

Merlin and Peregrine

Contextual information: Both merlin and peregrine are included on Annex I of the Birds Directive³, Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)⁷ and the SBL²⁹. Merlin is also included on the UK BoCC Red list due to a historical decline in the UK breeding population²³.

In Scotland merlin is a scarce resident breeding species on upland heather moorland, and a winter visitor to coastal and low-lying areas²⁵. The Scottish breeding population is estimated at 733 pairs¹⁰². In Sutherland, merlin is an uncommon but widely distributed breeding species and passage migrant³⁸, while numbers of breeding merlin appear to be relatively abundant in Caithness (compared to the national population) and potentially stable²². The breeding merlin population in NHZ 5 is estimated at 71 pairs³⁹. Breeding merlin is a qualifying interest of the Caithness and Sutherland Peatlands SPA, where the breeding population is estimated at 54 pairs⁹², and is listed as part of the breeding bird assemblage for which the Ramsar site is partly designated⁴³. The condition of the SPA population was last assessed (in 2004) as 'favourable maintained'⁹³.

Preliminary analysis of the data from the most recent national peregrine survey, carried out in 2014 in the UK and the Isle of Man, estimated the total number of breeding pairs at 1,505¹⁰³. Although this is similar to the total from the previous survey in 2002¹⁰⁴, national estimates are more divergent, with estimates for Wales, Scotland and the Isle of Man lower in 2014 compared to 2002. There were also large regional differences, with populations in predominantly lowland regions tending to be stable or increasing, while those in the majority of upland regions decreased. In Sutherland, peregrine is an uncommon, but widely distributed, breeding resident³⁸, while in Caithness Davey *et al.* (2015) described the species as a regular breeder, passage migrant and winter visitor, although the status of the species is described as "precarious"²². The breeding peregrine population in NHZ 5 is small, with an estimated at 15 pairs³⁹. Breeding peregrine is a qualifying interest of the North Caithness Cliffs SPA, where the population has declined to a single pair¹⁰⁵ and the latest assessed condition was 'unfavourable, declining' in 2014¹⁰⁶.

Baseline summary: Low levels of flight activity by both species were recorded during Flight Activity Surveys in all survey years (4-6 merlin flights and 2-6 peregrine flights per year). Both species were also recorded during Breeding Raptor Surveys in all survey years and there were occasional incidental records during other breeding season surveys. A breeding merlin territory was confirmed to be present within the Breeding Raptor Survey Area in 2018, and was potentially also active in 2015. Further details of this and additional, historic breeding territories are provided in Appendix A8.5.

Potential construction effects: As no suitable nesting habitat for peregrine is present on Site, there will be no direct habitat loss of breeding habitat for this species. Although potentially suitable habitat for breeding merlin could be lost, the Development has been designed to avoid any areas where merlin breeding territories have been recorded. Furthermore, the extent of habitat loss will be small. Similarly, although both species may lose suitable foraging habitat, the extent will be minor and alternative foraging habitat is

¹⁰² Ewing, S.R., Rebecca, G.W., Heavisides, A., Court, I., Lindley, P., Ruddock, M., Cohen, S. & Eaton, M.A. (2011). Breeding status of Merlins *Falco columbarius* in the UK in 2008. *Bird Study* 58, 379–389.

¹⁰³ British Trust for Ornithology (undated). *Peregrine survey results*. Published online at: <https://www.bto.org/our-science/projects/peregrine-survey/results> (Accessed 27/08/2020).

¹⁰⁴ Banks, A.N., Crick, H.Q.P., Coombes, R., Benn, S., Ratcliffe, D.A. & Humphreys, E.M. (2010). The breeding status of Peregrine Falcons *Falco peregrinus* in the UK and Isle of Man in 2002. *Bird Study* 57, 421-436.

¹⁰⁵ Joint Nature Conservation Committee (2018). Natura 2000 – Standard Data Form: Site UK9001181, North Caithness Cliffs SPA. Available online at: <https://sitelink.nature.scot/site/8554> (Accessed 27/08/2020)

¹⁰⁶ NatureScot (2020) SiteLink. <https://sitelink.nature.scot/site/8554> (Accessed 27/08/2020).

present in the wider area. Moreover, disturbance to foraging birds during construction will be temporary.

The habitat within 750 m⁶⁷ of the turbines and associated infrastructure is unsuitable for nesting peregrine, and no merlin territories have been recorded within 500 m⁶⁷. Although it is possible that merlin could nest within 500 m⁶⁷ of turbines or associated infrastructure in future, relevant good practice measures described in Section 8.3.10.1 will be applied during construction to ensure compliance with legislation protecting Schedule 1 breeding birds such as merlin. As such, it is highly unlikely that any breeding birds will be disturbed during construction.

As such, potential construction phase effects on the Caithness and Sutherland Peatlands SPA and Ramsar site breeding merlin population and the North Caithness Cliffs SPA breeding peregrine population, both of which are considered to be IOFs of international importance, are assessed as being of low magnitude and **not significant**. No adverse effects on the integrity of either statutory designated site is predicted.

Potential operation effects: As noted above, no suitable peregrine breeding habitat is present within 750 m⁶⁷ of the turbines or associated infrastructure; therefore, breeding peregrine will not be disturbed during the operational phase. No breeding merlin territories have been identified within 500 m⁶⁷. Although it is possible that birds could breed within 500 m⁶⁷ of the Site or surrounding area in future, which would increase the potential for them to be disturbed, this is considered highly unlikely as the birds would be choosing to use the Site regardless of the presence of operational turbines. Furthermore, it is expected that the level of human activity on Site during operational works will be infrequent and of limited extent (both spatially and temporally). Where any major works are required during the operational phase, relevant good practice measures described in Section 8.3.10.1 will be applied to ensure compliance with legislation protecting breeding Schedule 1 species such as merlin.

Based on the 2015-16 data, the CRM predicted an annual⁵⁶ collision risk to merlin of 0.014 birds (all of which would occur during the breeding season) or one collision every 70.449 years⁷⁹. The mean breeding season collision risk was 0.009 birds, which would represent 0.008% of the Caithness and Sutherland Peatlands SPA and Ramsar site population (108 birds⁹²), the condition of which, was most recently assessed as 'favourable maintained'⁹³.

As noted in Section 8.3.6.1, there was a gap in VP viewshed coverage and it is acknowledged that there could have been some undetected merlin flights at PCH within this gap. However, given the narrow height band and limited area, it is anticipated that levels of undetected flight activity at PCH would be low (particularly as no active or historic breeding merlin territories were identified within 500 m⁶⁷ of the turbines). As such, it is considered unlikely that any undetected flights would increase collision risk to such an extent that there could be a significant effect on the SPA breeding population. Although it is also possible that Site use by breeding and/or foraging birds could increase post-construction due to the habitat enhancements outlined in in **Chapter 7: Ecology**, these areas will be located more than 500 m⁶⁷ from turbines and it is considered unlikely that there would be more than a minor increase in collision risk.

Based on the 2015-16 data, the CRM predicted an annual⁵⁶ collision risk to peregrine of 0.001 birds (all of which would occur during the breeding season) or one collision every 1,543.366 years⁷⁹. The predicted mean breeding season collision risk was 0.007 birds, which would represent 0.35% of the North Caithness Cliffs SPA population (two birds⁹²). As the population is so small, it is acknowledged that this appears relatively high, but it nevertheless equates to one bird every 146.989 years, which is almost six times the expected 25-year life-span of the Development. Furthermore, as the core foraging range of peregrine is 2 km³¹ and the turbines are located more than 2 km from all territories identified during the Desk Study, it is considered unlikely that birds will make more than

occasional foraging flights over the Development in future. As the maximum recorded foraging range for this species is 18 km³¹, it is possible that some of the birds recorded during Baseline Ornithology Surveys may have been associated with breeding territories outwith the SPA.

As such, potential operational phase effects on the Caithness and Sutherland Peatlands SPA and Ramsar site breeding merlin population and the North Caithness Cliffs SPA breeding peregrine population, both of which are considered to be IOFs of international importance, are assessed as being of negligible magnitude and **not significant**, with no adverse effects on the integrity of either statutory designated site.

Potential decommissioning effects: These are likely to be of the same nature as construction effects. Therefore, potential effects during decommissioning on the Caithness and Sutherland Peatlands SPA and Ramsar site breeding merlin population and the North Caithness Cliffs SPA breeding peregrine population, both of which are considered to be IOFs of international importance, are assessed as being of low magnitude and **no significant** effects are predicted for either IOF. No adverse effect on the integrity of the SPAs and Ramsar site are predicted.

8.5.3.2 Species of Regional Importance

Osprey and White-tailed Eagle

Contextual information: Both osprey and white-tailed eagle are listed on Annex I of the Birds Directive³, Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)⁷ and the SBL²⁹. White-tailed eagle is also listed on Schedules 1A and A1 of the Wildlife and Countryside Act 1981 (as amended)⁷ and is included on the UK BoCC Red list due to a historical decline in the UK breeding population²³, while osprey is included on the UK BoCC Amber list due to a historical decline and the rarity of the UK breeding population²³.

The numbers and range of the Scottish osprey population have steadily increased since the 1950s⁸¹ and in 2016 it was estimated at 224 pairs²⁰. In 2013 the breeding osprey population in NHZ 5 was estimated at eight pairs³⁹. However, in 2018, Scottish raptor workers recorded 20 osprey breeding sites in Sutherland that were occupied by pairs²⁰, which suggests that the local breeding population is increasing. This is supported by Symonds & Vittery (2018)³⁸, who describe osprey as an increasing breeding species in Sutherland (with most pairs present in the south). Similarly, Davey *et al.* (2015) describe the species as a regular breeding bird and passage migrant in Caithness, noting that population appears to be slowly increasing in the area²².

Following successful reintroductions into the western Highlands, the Scottish white-tailed eagle population has gradually increased in numbers and range⁸¹, and the breeding population was estimated at 104 pairs in 2016²⁰. In 2013 a single pair of white-tailed eagles was estimated to be breeding in NHZ 5³⁹. However, in 2018, three home ranges occupied by pairs were reported by Scottish raptor workers in Sutherland, and at least five chicks were fledged from these three nests²⁰. This indicates that the regional population is increasing, which is supported by Symonds & Vittery (2018)³⁸, who note that wandering birds from the west Scotland re-introduction programme have occurred with increasing frequency since the early 1990s and the species is expected to spread more widely in Sutherland in future.

Baseline summary: Flight activity of both species was low, with just six osprey flights (three in 2015 and three in 2018) and three white-tailed eagle flights (all in 2018) recorded during the breeding season Flight Activity Surveys. During the Breeding Raptor Surveys there were three flights of each species (all single birds) in 2015 and a single white-tailed eagle flight in 2018. There were also occasional incidental registrations of both species during the 2015 breeding season. All registrations were single birds, and the majority of white-tailed eagle observations were of an immature bird. No breeding

territories of either species were identified during the Desk Study within 750 m and 1 km⁶⁷ of the Site respectively.

Potential construction effects: Construction of the Development will not result in a loss of breeding, roosting or fishing habitat for either species. White-tailed eagle may lose a small amount of foraging habitat, but the extent is considered negligible, and survey results indicate that use of the Breeding Raptor Survey Area by foraging birds is no more than occasional.

As there is no suitable osprey or white-tailed eagle breeding habitat within 750 m and 1 km⁶⁷ of the Site respectively, breeding birds will not be disturbed during the construction phase. As the numbers and range of breeding populations of both species in the wider area appear to be increasing, it is possible that birds could be present more frequently in future, which could result in disturbance of foraging birds during construction. However, this will be temporary, and the habitat in the wider area will provide suitable alternative feeding habitat for any foraging birds that are temporarily displaced.

As such, potential construction phase effects on the NHZ 5 breeding osprey and white-tailed eagle populations, both of which are considered to be IOFs of regional importance, are assessed as being of negligible magnitude and **not significant**.

Potential operation effects: As noted above, the lack of suitable nesting habitat for osprey and white-tailed eagle means that breeding birds will not be disturbed during operation, but it is possible that foraging birds could occur within and around the Site more frequently in future. Although this would increase the potential for foraging birds to be disturbed, this is considered highly unlikely as the birds would be choosing to forage close to the Site regardless of the presence of operational turbines. Moreover, it is expected that the level of human activity on Site during operational works will be infrequent and of limited extent (both spatially and temporally).

Compared with many other raptor species, the reported collision rates for osprey and white-tailed eagle at European wind farms are relatively high⁹⁸, with at least three osprey collisions¹⁰¹ and two white-tailed eagle collisions^{101,107} reported in the UK. Studies of white-tailed eagles have shown that birds are particularly vulnerable to turbine collision risk in areas they regularly use such, as Smøla in central Norway (e.g. Nygård *et al.*, 2010¹⁰⁸). However, the results of recent modelling of the reintroduced Scottish white-tailed eagle population¹⁰⁹ suggested that it could continue to grow to over 200 pairs by 2025. The study also found that, although potential additional mortality caused by illegal killing and collisions with wind turbines resulted in a reduction in population growth, this was not to the extent that it caused a population decline.

Levels of flight activity recorded during Baseline Ornithology Surveys were very low for both osprey and white-tailed eagle. The CRM for osprey predicted annual⁵⁶ collision risks of 0.013 and 0.006 breeding birds in 2015 and 2018 respectively. This results in a mean annual collision risk¹¹⁰ of 0.009 birds, or one collision every 109.023 years⁷⁹, which represents 0.056% of the NHZ 5 breeding osprey population (16 birds³⁹). However, the most recent annual *Scottish Raptor Monitoring Scheme Report*²⁰ indicates that the population has grown significantly in recent years, which would mean that the potential impact on the NHZ population is much lower than this.

¹⁰⁷ Raptor Persecution UK (2014). *Sea eagle killed at Scottish windfarm but persecution remains greatest threat*. Published online at: <https://raptorpersecutionscotland.wordpress.com/2014/05/25/sea-eagle-killed-at-scottish-windfarm-but-persecution-remains-greatest-threat/> (Accessed 27/08/20).

¹⁰⁸ Nygård, T., Bevanger, K., Dahl, E.L., Flagstad, Ø., Follestad, Lund Hoel, P., May, R. & Reitan, O. (2010). *A study of White-tailed Eagle Haliaeetus albicilla movements*. BOU Proceedings – Climate Change and Birds.

¹⁰⁹ Sansom, A., Evans, R. & Roos, S. (2016). Population and future range modelling of reintroduced Scottish white-tailed eagles (*Haliaeetus albicilla*). *Scottish Natural Heritage Commissioned Report No. 898*.

¹¹⁰ As osprey is a summer visitor to the UK, the breeding season collision risk is equivalent to the annual collision risk.

The mean breeding season CRM for white-tailed eagle was 0.007 birds, which represents 0.35% of the NHZ 5 breeding white-tailed eagle population (two birds³⁹). Although this is relatively high, due to the small population size, it nevertheless equates to a single bird every 136.111 years⁷⁹, which more than five times the expected 25-year life-span of the Development. Moreover, the most recent annual *Scottish Raptor Monitoring Scheme Report*⁸⁰ indicates that the population has grown in recent years, which would mean that the potential effects on the NHZ population would be much lower than this, particularly if the population expansion continues over the lifetime of the Development. Furthermore, given that no breeding white-tailed eagle territories are present within 5 km, which is the core range for this species³¹, it is unlikely that the NHZ 5 breeding population will be at risk of collisions. This is supported by the fact that the majority of white-tailed eagle observations were of immature birds, and it is unlikely that these birds were breeding since the species typically begins breeding at 5-6 years old¹¹¹, by which time immature birds have moulted into adult plumage¹¹². Maximum juvenile dispersal distances from the nest (or release) site to locations recorded prior to birds settling on a breeding site have been shown to range from 18 to 200 km, with the most extensive movements occurring during the first two years after fledging¹¹³. Thus, the immature birds recorded during the Baseline Ornithology Surveys are likely to be transient, non-breeding individuals.

Although both osprey and white-tailed eagle may occur more frequently in future if birds begin breeding in the wider area, which in theory could increase potential collision risk, this is likely to be offset by the increased population size such that overall collision risk to the regional populations will not increase.

As such, it is expected that potential operational phase effects on the NHZ 5 breeding osprey and white-tailed eagle populations, both of which are considered to be IOFs of regional importance, will be of low magnitude and **no significant** negative effects are predicted.

Potential decommissioning effects: These are likely to be of the same nature as construction effects. Therefore, potential effects during decommissioning on the NHZ 5 breeding osprey and white-tailed eagle populations, both of which are considered to be IOFs of regional importance, are assessed as being of negligible magnitude and **not significant**.

Golden Eagle

Contextual information: Golden eagle is included on Annex I of the Birds Directive³, Schedules 1, 1A and A1 of the Wildlife and Countryside Act 1981 (as amended)⁷ and the SBL²⁹. The most recent national census found that the British golden eagle population comprises 508 territorial pairs, an increase of 15% since 2003¹¹⁴, although the population is now restricted to Scotland. Based on these findings, the conservation status of the Scottish population is currently assessed as favourable in Scotland, but while home range occupancy has increased, there is regional variation, with some regions falling below the target levels for favourable conservation status.

The breeding golden eagle population in NHZ 5 has been estimated at 18 occupied territories³⁹. Breeding golden eagle is a qualifying interest of the Caithness and Sutherland Peatlands SPA, where the population was estimated at five pairs in 1992⁹²

¹¹¹ <https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/white-tailed-eagle/breeding/> (Accessed 27/08/2020)

¹¹² Cramp, S. & Simmons, K.E.L. (1980) *The Handbook of the Birds of Europe, the Middle East and North Africa. Volume 2: Hawks to Bustards*. Oxford University Press, Oxford.

¹¹³ Whitfield, D. P., Duffy, K., McLeod, D. R. A., Evans, R. J., MacLennan, A. M., Reid, R., Sexton, D., Wilson, J. D. & Douse, A. (2009). Juvenile dispersal of White-tailed Eagles in Western Scotland. *Journal of Raptor Research* 43, 110-120.

¹¹⁴ Hayhow, D.B., Benn, S., Stevenson, A., Stirling-Aird, P.K. & Eaton, M.A. (2017). Status of Golden Eagle *Aquila chrysaetos* in Britain in 2015. *Bird Study* 64, 281-294.

and the latest assessed condition was 'favourable maintained' in 2016⁹³. The species is also a component of the Ramsar site breeding bird assemblage (which is a designated feature)⁴³. Symonds & Vittery (2018) state that there is a resident breeding population in Sutherland of around 60 pairs, concentrated in the west and north-west³⁸. In 2018, 32 territories occupied by golden eagle pairs were reported by Scottish raptor workers in Sutherland²⁰. Although the species is described as a regular breeding bird and winter resident in Caithness, Davey *et al.* (2015)²² note that the status of golden eagle in the area has always been precarious due to a variety of factors, including persecution.

Baseline summary: Very low levels of flight activity were recorded, with just 1-2 flights each survey year (Table 8.10). There were also a small number of golden eagle registrations during the 2015 and 2018 Breeding Raptor Surveys as well a single incidental observation of an immature bird during the 2014 breeding season (see Table 8.12). Details of golden eagle records obtained during the Desk Study are detailed in Appendix A8.5. However, no active or historic breeding territories were identified within 1.5 km of the Site⁶⁷.

Potential construction effects: There will be no direct loss of any breeding or roosting habitat due to construction of the Development. Although a small amount of potential foraging habitat will be lost, the extent will be negligible in the context of the species foraging range (the core range is 6 km from nest sites, with maximum range of up to 9 km³¹).

No breeding territories are present within 1.5 km⁶⁷ of the turbines or associated infrastructure, and as the habitats within this area are sub-optimal for breeding birds, it is considered highly unlikely that there is any potential for breeding golden eagles to be disturbed during the construction phase. In addition, relevant good practice measures described in Section 8.3.10.1 will be applied during construction to ensure compliance with legislation protecting Schedule 1 breeding birds such as golden eagle. It is possible that disturbance during construction will mean that birds avoid hunting over the Site during this period. However, the low level of flight activity recorded during all survey years indicates that birds do not make regular use of the Site for hunting.

As such, potential construction phase effects on the Caithness and Sutherland Peatlands SPA and Ramsar site breeding golden eagle population, which is considered to be an IOF of regional importance, are assessed as being of negligible magnitude and **not significant**. No adverse effect on the integrity of the SPA and Ramsar site is predicted.

Potential operation effects: As noted above, no breeding golden eagle territories are present within 1.5 km⁶⁷ of Site and, based on the habitats present, it is unlikely that birds will breed there in future. As flight activity over the Core Study Area was very low during all survey years, CRM was not carried out for this species. As noted above, these results indicate that use of the Core Study Area by foraging golden eagles is no more than occasional. Based on this, and evidence from several Scottish wind farms that breeding golden eagles avoid operational turbines¹¹⁵, it is considered highly unlikely that use of the Core Study Area by foraging golden eagles will increase during operation, and collision risk to this species is likely to be negligible.

As such, potential operation phase effects on the Caithness and Sutherland Peatlands SPA and Ramsar site breeding golden eagle population, which is considered to be an IOF of regional importance, are assessed as being of negligible magnitude and **not significant**. No adverse effect on the integrity of the SPA and Ramsar site is predicted.

Potential decommissioning effects: These are likely to be of the same nature as construction effects. Therefore, potential effects during decommissioning on golden eagle, which is considered to be an IOF of regional importance, **no significant** during

¹¹⁵ Fielding, A. & Haworth, O. (2010). *Golden eagles and wind farms*. A report created under an SNH Call-of-Contract Arrangement.

are predicted for and no adverse effect on the integrity of the SPA and Ramsar site is predicted.

Lapwing, Curlew and Snipe

Contextual information: Both lapwing and curlew are included on the SBL and are also Red-listed due to severe declines in the UK breeding populations²³. Snipe is included on the UK BoCC Amber list due to a moderate decline in the breeding range²³.

With estimated breeding populations of 71,500-105,600 lapwing pairs, 58,000 curlew pairs and 10,000-30,000 snipe pairs, all three wader species are common and widespread breeding birds in Scotland²⁵. However, data from the national Breeding Bird Survey organised by the BTO found that numbers of breeding lapwings in Scotland declined by 55% between 1995 and 2017, while those of curlew declined by 61%¹¹⁶. In contrast, numbers of breeding snipe in Scotland increased by 32% over the same period.

In Sutherland, lapwing is still a fairly common breeding bird, although there has been a marked decline, possibly due partly to increased predation of chicks³⁸. Similarly, in Caithness, although the species is a regular breeding bird, chicks are particularly vulnerable due to predation and poor weather, and there has been an estimated decline in lapwing breeding productivity of approximately 90% between national bird atlas surveys in 1988-91 and 2007-12²². There is no published lapwing population estimate for NHZ 5.

In Caithness and Sutherland^{22,38}, curlew is a regular and widespread breeding bird, passage migrant and winter visitor, although declines in breeding curlews have been reported across Caithness²². The NHZ 5 breeding curlew population is estimated at 1,737 pairs³⁹.

Snipe is described as a common breeding species and passage migrant in Sutherland³⁸ and a widespread and ubiquitous species in Caithness, where it regularly breeds and occurs as a passage migrant and winter visitor²². The NHZ 5 breeding snipe population is estimated at 2,673 pairs³⁹.

Baseline summary: Low to moderate levels of flight activity were recorded during Flight Activity Surveys in all survey years, with lapwing the species requested least frequently of the three waders and curlew the one observed most often. Most lapwing activity and all curlew and snipe activity was recorded during the breeding seasons, when a minimum of 1-3, 3-6 curlew and 3-6 snipe territories were identified within 500 m of the Site each year (Section 8.4.2.2). All lapwing breeding territories were located in the fields in the west of the Moorland Breeding Bird Survey Area, while curlew and snipe territories were more scattered, and often occurred in different locations between years. Of the territories identified during each survey year, up to one lapwing, four curlew and three snipe territories were within 500 m of the turbines or associated infrastructure.

Potential construction effects: With the exception of the fields along the western edge of the Site, none of which will be lost due to construction of the Development, the habitat within the Core Study Area is sub-optimal for breeding and foraging lapwing which is a characteristic farmland bird²⁵, although they can nest on wet moors and mosses¹¹⁷. In contrast, the curlew territories were largely associated with blanket bog and heathland habitats and a small amount of this habitat will be lost due to construction, which will result in a loss of suitable breeding or foraging habitat, although the extent is limited and will be offset by the habitat enhancements outlined in **Chapter 7: Ecology**.

¹¹⁶ Harris, S.J., Massimino, D., Eaton, M.A., Gillings, S., Noble, D.G., Balmer, D.E., Pearce-Higgins, J.W. & Woodcock, P. (2019). *The Breeding Bird Survey 2018*. BTO Research Report 717. British Trust for Ornithology, Thetford.

¹¹⁷ Ferguson-Lees, J., Castell, R. & Leech, D. (2011). *A Field Guide to Monitoring Nests*. British Trust for Ornithology.

Although there is no recommended buffer to minimise disturbance to any of these wader species, as the majority of lapwing territories were located more than 500 m from the proposed turbine locations and associated infrastructure, the potential for disturbance to breeding birds during construction is likely to be minimal, and any disturbance that occurs will be temporary. Moreover, in contrast to several other study species, a study of the impacts of wind farms on several upland breeding bird species by Pearce-Higgins *et al.* (2012)¹¹⁸ did not find any significant changes in lapwing breeding density in response to turbine construction. Based on the survey results, as a worst-case scenario, it is considered possible that a single lapwing territory could be displaced (since there was a maximum of one territory within 500 m of proposed infrastructure each year), but it is likely that any displaced birds can be accommodated in the surrounding area.

The same study reported significant decreases in curlew and snipe densities of 40% and 53% respectively during construction. It is therefore considered likely that territories of both species located within 500 m of the proposed turbine locations or associated infrastructure could be displaced. Based on the survey results, this would result in the displacement of up to four breeding pairs of curlew and three of snipe. Given that both species were recorded in scattered locations, suitable habitat is present across a wide area within and around the Site, and it is possible that at least some displaced pairs could be accommodated elsewhere within the Site and surrounding area. However, it is acknowledged that the study by Pearce-Higgins *et al.* (2012)¹¹⁸ found that curlew and snipe densities had not recovered by the first year after construction. Thus, it is possible that any birds displaced from the Site may not return, at least in the short-term, despite the temporary duration of construction works. A loss of up to four curlew pairs represents 0.23% of the NHZ 5 breeding population (1,737 pairs³⁹), while a loss of up to three snipe pairs represents 0.11% of the NHZ 5 breeding snipe population (2,673 pairs³⁹), which is unlikely to result in a significant impact on either population. Furthermore, the embedded mitigation outlined in Section 8.3.10.1 includes good practice measures to minimise disturbance to breeding birds, and it is considered likely that any displaced birds could be accommodated in the surrounding area, such as the adjacent Caithness and Sutherland Peatlands SPA.

As such, potential construction phase effects on the regional lapwing, curlew and snipe populations, each of which is considered to be an IOF of regional importance, are assessed as being of low magnitude and **not significant**.

Potential operation effects: As noted above, breeding lapwing territories were located in the fields along the western edge of the Site, the majority more than 500 m from turbines, and there is some evidence to suggest that lapwing breeding density does not change in response to turbine operation¹¹⁹. The potential for breeding lapwing to be disturbed during the operational phase is therefore considered to be low. While the results of a study by Pearce-Higgins *et al.* (2009)¹¹⁹ indicated that breeding curlew and snipe would be displaced from 500 m around operational turbines, a long-term monitoring study by Whitfield *et al.* (2010)¹²⁰ found no evidence that curlew were displaced due to wind farm infrastructure. Davey *et al.* (2015)²² note that all three wader species appear to have benefitted from the post-construction habitats made available in Caithness through large-scale felling of plantations for onshore wind farm developments, which has allowed birds to return to areas that formerly provided good breeding habitat. During the operational phase, any birds breeding on Site would be selecting nest sites regardless of the presence

¹¹⁸ Pearce-Higgins, J. W., Stephen, L., Douse, A. and Langston, R. H. W. (2012). Greater impacts of wind farms on bird populations during construction than subsequent operation: results of a multi-site and multi-species analysis. *Journal of Applied Ecology*, 49: 386–394.

¹¹⁹ Pearce-Higgins, J.W. Stephen, L. Langston, R.H.W. Bainbridge, I.P. & Bullman, R. (2009) The distribution of breeding birds around upland wind farms. *Journal of Applied Ecology* 46, 1323-1331.

¹²⁰ Whitfield, D.P. Green, M. & Fielding, A.H. (2010). Are breeding Eurasian curlew *Numenius arquata* displaced by wind energy developments? Natural Research Projects Ltd, Banchory, Scotland.

of operational turbines. In addition, Pearce-Higgins *et al.* (2012)¹¹⁸ suggest that, following any detrimental effects of disturbance during construction, populations of upland breeding birds may become habituated to operational wind farms. Furthermore, it is expected that the level of human activity on Site during operational works will be infrequent and of limited extent (both spatially and temporally). Where any major works are required during the operational phase, relevant good practice measures described in Section 8.3.10.1 will be applied to ensure compliance with legislation protecting breeding birds.

Reported collision rates for lapwing and curlew at European wind farms are relatively low with none reported in the UK⁹⁸, suggesting that collision risk is not particularly high in either species. Rates for snipe are marginally higher, with a single collision reported in the UK⁹⁸.

- Based on the 2015-16 data, the CRM predicted an annual/seasonal⁵⁶ collision rate of 0.012 lapwing collisions, or one bird every 84.864 years (during the breeding season); the mean breeding season collision risk was also 0.012 collisions per year. As noted above, there are no population estimates available for the NHZ 5 lapwing population, but it is considered highly unlikely that such low collision rates will have a significant impact on the regional breeding population.
- Based on the 2015-16 data, the CRM predicted an annual/seasonal⁵⁶ collision rate of 0.066 curlew collisions, or one bird every 15.065 years. The mean breeding season collision risk was 0.041 birds, which would represent 0.001% of the NHZ 5 breeding population (3,474 individuals³⁹). This will not have a significant effect on the breeding population.
- Based on the 2015-16 data, the CRM predicted an annual/seasonal⁵⁶ collision rate of 0.043 snipe collisions, or one bird every 23.099 years. The mean breeding season collision risk was 0.023 birds, which would represent 0.0004% of the NHZ 5 breeding population (5,346 individuals³⁹). Clearly, this will not have a significant effect on the breeding population.

The study by Pearce-Higgins *et al.* (2012)¹¹⁸ found little evidence for differences in upland breeding bird population trends between operational wind farms and reference sites, implying that any increase in mortality through collision, or other changes associated with wind farm operation, has little effect on local populations of study species.

As the extent of suitable habitat for breeding lapwing is limited, it is not expected that Site use will increase post-construction, particularly in the context of national and regional population declines. Although it is possible that Site use by breeding curlew and snipe could increase post-construction due to the habitat enhancements outlined in **Chapter 7: Ecology**, these areas will be located more than 500 m from turbines, and it is considered unlikely that there will be anything more than a minor increase in collision risk to either species.

As such, it is expected that potential operational phase effects on the regional lapwing, curlew and snipe populations, each of which is considered to be an IOF of regional importance, will be of low magnitude and **not significant**.

Potential decommissioning effects: These are considered likely to be of the same nature as construction effects. Therefore, potential effects during decommissioning on lapwing, curlew and snipe, each of which is considered to be an IOF of regional importance, are assessed as being of low magnitude and **not significant**.

Golden Plover, Dunlin and Greenshank

Contextual information: Golden plover and dunlin are both listed on Annex I of the Birds Directive³ and the SBL²⁹, while greenshank is a Schedule 1 breeding species⁷. Dunlin and greenshank are both Amber-listed BoCC, the former due to declines in both the UK breeding and non-breeding populations, and the latter due to the localised distribution of

the UK breeding population²³. All three species are designated features of the Caithness and Sutherland Peatlands SPA; breeding dunlin is also a designated feature of the Caithness and Sutherland Peatlands Ramsar site, while golden plover and greenshank are part of the breeding bird assemblage feature of the Ramsar site⁴³.

With an estimated Scottish breeding population of 15,000 pairs, golden plover is a widespread breeding bird in the uplands, particularly in the Highlands and Islands²⁵. Within the core breeding range in Scotland, highest densities occur in the Outer Hebrides, Shetland, and the flows of Caithness and Sutherland²⁵. In winter, most birds move short distances to coastal locations, where they are joined by immigrants from Iceland, Greenland and Fennoscandia. The Scottish wintering population is estimated at 25,000-35,000 birds²⁵. In Caithness, golden plover is a widespread summer resident on moors and uplands, although the population has been steadily declining²². Breeding birds have also suffered a serious decline in Sutherland³⁸. The NHZ 5 population has been estimated at 3,125 breeding pairs³⁹, while the Caithness and Sutherland Peatlands SPA breeding golden plover population was estimated at 1,922 pairs³⁷ and the latest assessed condition was 'favourable recovered' in 2015⁹³.

A number of dunlin subspecies pass through Britain, the most common of which are southern dunlin (*Calidris alpina schinzi*), which breeds in Scotland; and the northern dunlin (*C. a. alpina*), which is a passage migrant and winter visitor¹²¹. An estimated 8,000-10,000 pairs of the southern subspecies breed in Scotland, with highest numbers in the north and west mainland as well as the Outer Hebrides and Shetland²⁵. In Sutherland the species is a declining breeding bird, as well as a common passage migrant and winter resident (with the largest numbers in the south-east)³⁸. In Caithness the species is a regular breeding bird, passage migrant and winter visitor, although the breeding population has suffered dramatic reductions over recent decades as a result of the encroachment of forestry, with its associated edge effect²². The breeding population in NHZ 5 has been estimated at 2,196 pairs³⁹, while the Caithness and Sutherland Peatlands SPA breeding dunlin population is estimated at 1,366 pairs³⁷ and the latest assessed condition was 'favourable maintained in 2015'⁹³.

With an estimated 1,100 breeding pairs⁹¹, greenshank is an uncommon breeding species in Scotland, restricted to areas of suitable moorland in the Outer Hebrides and north-west of the mainland²⁵. In Sutherland the species is described as a fairly common breeding bird and passage migrant³⁸. In Caithness the species is a regular breeding bird and passage migrant, although, like dunlin, the species has been particularly adversely affected by afforestation²². The NHZ 5 population has been estimated at 421 breeding pairs³⁹, while the Caithness and Sutherland Peatlands SPA breeding greenshank population was estimated at 653 pairs in 2009⁹² and the latest assessed condition was 'favourable maintained' in 2015⁹³.

Baseline summary: Low levels of flight activity by all three species were recorded during the Flight Activity Surveys. There were also registrations of all three species during one or more Moorland Breeding Bird Surveys, as well as occasional incidental records during other breeding season surveys. Golden plover and dunlin were potentially breeding in 2014 and 2015, with 1-2 territories of each species recorded annually, while observations of a singing greenshank in 2018 indicated that this species attempted to establish a breeding territory, although there was no evidence that breeding took place. Territory locations are provided in Appendix A8.5. Single dunlin and golden plover territories were located within 500 m of turbines or associated infrastructure in 2014 and 2015 respectively. All other breeding territories of these species, as well as the potential greenshank territory, were more than 500 m away.

¹²¹ Davey, P., Manson, S., Maughan, E., Omand, D. & Smith, J. (eds) (2015) *Birds of Caithness including The Breeding & Wintering Atlas 2007-2012*. Caithness SOC.

Potential construction effects: Construction of the Development is likely to result in a loss of suitable breeding and/or foraging habitat for golden plover and dunlin (but not greenshank). However, the amount of suitable habitat that will be lost is very small, and given that the species made very low use of the Core Study Area, effects of habitat loss are likely to be minimal.

There is no recommended buffer to minimise disturbance to any of these species. However, a study by Sansom *et al.* (2016)¹²² found that disturbance activity during construction had no significant effect on golden plover breeding abundance or distribution. Similarly, a study by Pearce-Higgins *et al.* (2012)¹¹⁸ did not find any evidence of significant negative effects of wind farms on golden plover or dunlin during construction. Furthermore, any disturbance during construction will be temporary, and relevant good practice measures described in Section 8.3.10.1 will be applied during construction to ensure compliance with legislation protecting all breeding birds.

Nevertheless, it is considered possible that territories within 500 m of construction works could result in displacement of breeding birds due to disturbance. Based on the survey results, this could result in the loss of single pairs of golden plover and dunlin, which would represent 0.05% and 0.07% respectively of the Caithness and Sutherland SPA breeding populations (3,844 golden plover and 2,732 dunlin³⁷). No displacement of breeding greenshank due to construction is predicted.

As such, potential construction phase effects on the Caithness and Sutherland Peatlands SPA and Ramsar site breeding golden plover, dunlin and greenshank populations, each of which is considered to be an IOF of regional importance, are assessed as being of low magnitude and **not significant**. No adverse effects on the integrity of the SPA and Ramsar site are predicted.

Potential operation effects: Studies of potential effects of onshore wind farms on upland breeding birds have had mixed results in relation to golden plover, with two studies^{123,124} finding no evidence of displacement due to wind farm infrastructure, in contrast to two^{119,122} which found that breeding golden plover were significantly displaced by up to 500 m from operational turbines. A long-term study of breeding dunlin at Farr Wind Farm near Inverness¹²⁵ did not find any evidence that birds were displaced from the wind farm (either in the short-term or long-term) and there was no significant decline in the number of breeding attempts. As noted above, Pearce-Higgins *et al.* (2012)¹¹⁸ suggest that, following any detrimental effects of disturbance during construction, populations of upland breeding birds may become habituated to operational wind farms. Furthermore, based on the low levels of activity recorded for all three species, the potential for breeding birds to be displaced is limited. In addition, any birds breeding on Site would be selecting nest sites regardless of the presence of operational turbines, and it is expected that the level of human activity on Site during operational works will be infrequent and of limited extent (both spatially and temporally). Where any major works are required during the operational phase, relevant good practice measures described in Section 8.3.10.1 will be applied to ensure compliance with legislation protecting all breeding birds.

Levels of dunlin and greenshank flight activity were very low and therefore CRM was not completed for these species. Furthermore, with no reported greenshank collisions at

¹²² Sansom, A., Pearce-Higgins, J.W., and Douglas, D.J.T. (2016). Negative impact of wind energy development on a breeding shorebird assessed with BACI study design. *Ibis* 158, 3, 541-555.

¹²³ Douglas, D.J.T. Bellamy, P.E. & Pearce-Higgins, J.W. (2011) Changes in the abundance and distribution of upland breeding birds at an operational wind farm. *Bird Study* 58, 37-43.

¹²⁴ Fielding, A.H. & Haworth, P.F. (2013) Farr windfarm: *A review of displacement disturbance on golden plover arising from operational turbines between 2005-2013*. Haworth Conservation, Isle of Mull, Scotland.

¹²⁵ Fielding & Haworth (2015). Farr wind farm: A review of displacement disturbance on dunlin arising from operational turbines 2002-2015. Haworth Conservation. Available online at: www.alanfielding.co.uk/fielding/pdfs/Farr_windfarm_Dunlin_final.pdf (Accessed 27/08/2020)

European wind farms, and just four of dunlin, none of which were in the UK⁹⁸, collision rates of both species appear to be low. As such, it is highly unlikely that collision risk would be sufficient to result in a significant effect to the Caithness and Sutherland Peatlands SPA populations of either species.

Reported collision rates for golden plover at European wind farms are higher than other wader species recorded during Baseline Ornithology Surveys⁹⁸, indicating that this species may be more susceptible to colliding with turbines than other upland breeding waders that regularly occur within and around wind farm developments. However, levels of golden plover flight activity over the Core Study Area were very low and, based on the 2015-16 data, the CRM predicted an annual/seasonal⁵⁶ collision rate of 0.001 birds, or one bird every 792.044 years. The predicted mean breeding season collision risk was 0.017 birds, which would represent 0.0004% of the Caithness and Sutherland Peatlands SPA and Ramsar site golden plover population (3,844 birds³⁷), the condition of which, was most recently assessed as 'favourable recovered'⁷⁷. Clearly this will not have a significant effect on the breeding population.

Although it is possible that Site use by breeding golden plover and dunlin could increase post-construction due to the habitat enhancements outlined in **Chapter 7: Ecology**, these areas will be located more than 500 m from turbines, and it is considered unlikely that there will be anything more than a minor increase in collision risk to either species.

As noted above, the study by Pearce-Higgins *et al.* (2012)¹¹⁸ found little evidence for differences in upland breeding bird population trends (including golden plover and dunlin) between operational wind farms and reference sites, implying that any increase in mortality through collision, or other changes associated with wind farm operation, has little effect on local populations of study species.

As such, potential operation phase effects on the Caithness and Sutherland Peatlands SPA and Ramsar site breeding golden plover, dunlin and greenshank populations, each of which is considered to be an IOF of regional importance, are assessed as being of low (golden plover) to negligible (dunlin and greenshank) magnitude and **not significant**. No adverse effects on the integrity of the SPA and Ramsar site are predicted.

Potential decommissioning effects: These are likely to be of the same nature as construction effects. Therefore, potential effects during decommissioning on golden plover, dunlin or greenshank, each of which is considered to be an IOF of regional importance, are assessed as being of low magnitude and **not significant**. No adverse effects on the integrity of the SPA and Ramsar site are predicted.

Arctic Tern

Contextual information: Arctic tern is included on Annex I of the Birds Directive³, and the SBL²⁹. It is also included on the UK BoCC Amber list due to a historical decline and the rarity of the UK breeding population²³, which is estimated at 53,400 Apparently Occupied Nests (AON)¹²⁶. Arctic tern is a summer visitor to Scotland, nesting discontinuously around the coasts of the mainland (but with strongholds in Orkney and Shetland)²⁰. The population has fluctuated over recent decades, with declines caused by a combination of factors, including predation and shortages in sandeels, which are an important food source for this species¹²⁷.

With an estimated breeding population of 1,095 AON, of which 265 AON were on the north-west coast of Sutherland¹²⁶, Arctic tern is a regular breeding species in Caithness and Sutherland^{38,22}. As there is no population estimate for NHZ populations of breeding

¹²⁶ Mitchell, P.I., Newton, S.F., Ratcliffe, N. & Dunn, T.E. (eds.) (2004) *Seabird Populations of Britain and Ireland: results of the Seabird 2000 census (1998-2002)*. T. & A.D. Poyser, London.

¹²⁷ JNCC. 2016. Seabird Population Trends and Causes of Change: 1986-2015 Report (<http://jncc.defra.gov.uk/page-3201>). Joint Nature Conservation Committee. Updated September 2016.

Arctic terns, the estimate for the north-west coast of Sutherland, combined with estimates for the north coast of Caithness and inland Caithness, (859 AON in total¹²⁶), is considered to provide a representative estimate for the regional population.

Baseline summary: In 2014 low levels of flight activity were recorded during breeding season Flight Activity Surveys and there were also two incidental records during other breeding season surveys. The species was not recorded at all in 2015. In 2018, a small breeding colony (approximately six pairs) was established outside the Moorland Breeding Bird Survey Area (further details are presented in Appendix A8.5), and high levels of flight activity associated with the breeding colony were recorded. Although a small number of “downy/fledged” young were observed on 11/07/2018, the sudden disappearance of the colony the following day indicated that the colony failed, possibly due to predation (terns often desert breeding sites if they are disturbed²²). During the Desk Study, it was determined that breeding also took place at this location in 2016. In addition, RSPB records obtained as part of the Desk Study included a small breeding colony in the wider area in 2012 (more than 1 km from the Site).

Potential construction effects: Due to the lack of suitable habitat on Site, birds will not lose any breeding or foraging habitat due to construction of the Development.

Although the lack of breeding records in 2014 and 2015 indicates that the Arctic tern breeding site used in 2016 and 2018 may not be used in all years, it is assumed that birds could attempt to breed there again in future. There is no recommended buffer to minimise disturbance to Arctic tern. However, the breeding colony was located more than 500 m from the proposed turbine locations and associated infrastructure. Therefore, the potential for disturbance to breeding birds during construction is likely to be minimal, and any disturbance that occurs will be temporary. Furthermore, the good practice measures described in Section 8.3.10.1 will be applied during construction to ensure compliance with legislation protecting all breeding birds.

As such, potential construction phase effects on the NHZ 5 breeding Arctic tern population which is considered to be an IOF of regional importance, are assessed as being of negligible magnitude and **not significant**.

Potential operation effects: As noted above there is no suitable habitat for Arctic terns on Site. Although it is possible that small numbers could breed in the surrounding area in future, given the distance between the Development and suitable nesting habitat, the potential for disturbance during operation is low. Moreover, any birds breeding on Site would be selecting nest sites regardless of the presence of operational turbines.

High numbers of common tern (*Sterna hirundo*) and moderate numbers of sandwich tern (*Thalasseus sandvicensis*) and little tern (*Sternula albifrons*) collisions have been reported at wind farms in Belgium at coastal locations close to breeding colonies^{128,129}, suggesting that terns are vulnerable to collisions. However, no Arctic tern collisions have been reported at European wind farms to date⁹⁸, and the Development is not located in close proximity to any large, established breeding colonies. Based on the 2018 data, the CRM predicted that there would be 0.643 Arctic tern collisions during the breeding season⁵⁶, or one collision every 1.555 years⁷⁹. As no birds were present in 2015, the mean breeding season collision risk is 0.322 birds, or one collision every 3.106 years. Based on the regional breeding population estimate described above (1,718 individuals¹²⁶), an annual collision risk of 0.643 birds (which represents a ‘worst-case scenario’ because it assumes

¹²⁸ Everaert, J. & Stienen E. (2007). Impact of wind turbines on birds in Zeebrugge (Belgium). Significant effect on breeding tern colony due to collisions. *Biodiversity and Conservation* 16, 3345-3359.

¹²⁹ Everaert J. (2008). *Effecten van windturbines op de fauna in Vlaanderen. Onderzoeksresultaten, discussie en aanbevelingen*. Rapporten van het Instituut voor Natuur- en Bosonderzoek 2008 (rapportnr. INBO.R.2008.44). Instituut voor Natuur- en Bosonderzoek, Brussel.

that birds will be breeding every year) would represent 0.037% of the regional population, which is not predicted to have a significant effect.

As such, potential operational phase effects on the regional breeding Arctic tern population, which is considered to be an IOF of regional importance, are assessed as being of low magnitude and **not significant**.

Potential decommissioning effects: These are likely to be of the same nature as construction effects. Therefore, **potential** effects during decommissioning on Arctic tern, which is considered to be an IOF of regional importance, are assessed as being of negligible magnitude and **not significant**.

Short-eared Owl

Contextual information: Short-eared owl is listed on Annex I of the Birds Directive³ and the SBL²⁹. It is also Amber-listed due to moderate declines in the UK breeding range²³. With an estimated 125-1,250 breeding pairs and 300-3,000 wintering birds, short-eared owl is a restricted resident breeding species in Scotland, with birds usually moving between separate breeding and wintering areas²⁵. Short-eared owl is nomadic, and responds to changing prey abundance, moving away from areas where voles are scarce and quickly colonising those where voles are more abundant²⁰. In Sutherland, short-eared owl is a fairly widespread breeding summer visitor, favouring open areas at mid-altitude. In late summer, birds disperse to the coast where they are joined by passage migrants in autumn, but the species is uncommon in winter³⁸. In Caithness, short-eared owl is a regular breeding species, passage migrant and winter visitor, although the breeding range appears to have declined by as much as 70% in recent decades²². The breeding short-eared owl population in NHZ 5 has been estimated at 55 pairs³⁹. Breeding short-eared owl is a qualifying interest of the Caithness and Sutherland Peatlands SPA, where the breeding population is estimated at 30 pairs⁹², and is listed as part of the breeding bird assemblage for which the Ramsar site is partly designated⁴³.

Baseline summary: Two short-eared owl flights were recorded during the 2014 breeding season Flight Activity Surveys. There were also two registrations of a single bird during a Breeding Raptor Survey in May 2014, and it was noted that these were in suitable breeding habitat. However, the only other observation of this species was a possible sighting of a short-eared owl mobbing a golden eagle during a Breeding Diver Survey in July 2014. Although there was no other evidence of breeding, it is possible that birds could breed in this area in future, therefore details of the location are restricted to Appendix A8.5. There were no further observations of short-eared owl during any of the subsequent Baseline Ornithology Surveys, and no historic breeding or roosting records within 2 km of the Site were identified during the Desk Study.

Potential construction effects: Although a small amount of suitable breeding and foraging habitat may be lost due to construction of the Development, given the small extent and very limited use of the Core Study Area by short-eared owls, potential effects of habitat loss on this species are likely to be negligible.

The very low levels of activity recorded during the 2014 Baseline Ornithology Surveys suggest that Site use by short-eared owls is limited to occasional foraging in some years. Although it is possible that foraging birds could be disturbed during construction, this will be temporary and alternative foraging habitat is abundant in the wider area, notably in the adjacent Caithness and Sutherland Peatlands SPA. As there was no evidence of breeding and no roost sites were identified within 500 m⁶⁷ of the Development, it is considered unlikely that any breeding or roosting birds will be disturbed during construction. It is acknowledged that birds could breed or roost in this area in future, although the lack of records indicates that this is unlikely. Relevant good practice measures described in Section 8.3.10.1 will be applied during construction to ensure compliance with legislation protecting all breeding birds; measures to protect roosting

raptors are also outlined in the same Section. It is therefore highly unlikely that any breeding or roosting birds would be disturbed.

As such, potential operation phase effects on the Caithness and Sutherland Peatlands SPA and Ramsar site breeding short-eared owl population, which is considered to be an IOF of regional importance, are assessed as being of negligible magnitude and **not significant**. No adverse effects on the integrity of the SPA and Ramsar site are predicted.

Potential operation effects: As noted above, no breeding short-eared owls or regular roost sites were recorded during Baseline Ornithology Surveys, but birds may forage over the Site during the operational phase, and it is possible that birds could breed on Site or the surrounding area in future. However, birds would be choosing to use the Site regardless of the presence of operational turbines, and it is expected that the level of human activity on Site during operational works will be infrequent and of limited extent (both spatially and temporally). Therefore, the potential for disturbance during operation is minimal.

As no short-eared owl flights were recorded during Flight Activity Surveys completed within the last five years, CRM was not carried out for this species. As noted in Section 8.3.6.1, there was a gap in VP viewshed coverage and it is acknowledged that there could have been some undetected short-eared owl flights at PCH within this gap. However, given the narrow height band and limited area, it is anticipated that levels of undetected flight activity at PCH would be low (particularly as no active or historic breeding short-eared owl territories were identified within 500 m of the turbines). As such, it is considered unlikely that any undetected flights would increase collision risk to such an extent that there could be a significant effect on the SPA breeding population. Although it is also possible that Site use by breeding and/or foraging birds could increase post-construction due to the habitat enhancements outlined in in **Chapter 7: Ecology**, these areas will be located more than 500 m from turbines⁶⁷ and it is considered unlikely that there would be more than a minor increase in collision risk. Therefore, it is considered unlikely that collision risk would be high enough to significantly affect the integrity of the Caithness and Sutherland Peatlands SPA breeding population (30 pairs⁹²).

As such, it is expected that potential operational phase effects on the Caithness and Sutherland Peatlands SPA short-eared owl population, which is considered to be an IOF of regional importance, will be of negligible magnitude and **not significant**. No adverse effect on the integrity of the SPA is predicted.

Potential decommissioning effects: These are likely to be of the same nature as construction effects. Therefore, potential effects during decommissioning on short-eared owl, which is considered to be an IOF of regional importance, are assessed as being of negligible magnitude and **not significant**. No adverse effect on the integrity of the SPA and Ramsar site is predicted.

Crossbill Species

Contextual information: Crossbill and Scottish crossbill are listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended); Scottish crossbill is also included on Annex I of the Birds Directive, the SBL and the UK BoCC Amber list²³. In areas where their ranges overlap (including Sutherland), crossbill and Scottish crossbill cannot be reliably separated in the field (without using sonograms of their distinctive calls)⁷⁴. The crossbill species recorded during the Baseline Ornithology Surveys likely included crossbill, but could also have included small numbers of Scottish crossbill.

In Scotland, the crossbill population is estimated at 5,000-50,000 breeding pairs and 10,000-100,000 wintering birds in most years, while the Scottish crossbill population is estimated at 300-1,300 breeding pairs and 600-2,600 wintering birds²⁵. Crossbill is a breeding resident in Sutherland, with numbers fluctuating between years, while Scottish crossbill is an uncommon breeding resident in the south, although small foraging parties are frequently encountered further north³⁸. Crossbill is also regular resident breeding

species in Caithness, where birds now appear to be present in all the major coniferous plantations (having spread from the core site in Rumster Forest), although numbers encountered are generally small (flocks of greater than forty birds are rare). Scottish crossbill is described as a scarce passage migrant and winter visitor in Caithness²². No estimates for NHZ populations are available.

Baseline summary: Small numbers of crossbill species were recorded within the Moorland Breeding Bird Survey Area in all survey years and were likely to be breeding. However, surveys were undertaken outside of the main breeding season for crossbill species and the methods were not designed to target woodland breeding birds. Nonetheless, the extent of suitable habitat is very limited and numbers of breeding birds are likely to be very low.

Potential construction effects: As small numbers of crossbill species were likely to be nesting within the Core Study Area during all survey years, birds may lose nesting, roosting and foraging habitat if any woodland is felled. However, the extent of habitat loss is very small, and it is likely that the retained habitat will be sufficient to continue to support small numbers of breeding crossbill species.

Although retained woodland will shelter birds from disturbance, the maximum recommended buffer to avoid the risk of disturbance to breeding crossbill is 150 m²⁸, and any felling or other construction works within this buffer could result in disturbance to breeding birds. As noted above, the species recorded on Site likely included crossbill, which is irruptive and highly mobile in response to variations in conifer seed production²⁵. While Scottish crossbill (which could also be present on Site in small numbers) is resident and moves only short distances¹³⁰, the species is thought to move in response to changes in Scots pine cone crop, and movements of up to 23 km between woodlands have been recorded²⁵. It is therefore considered likely that any displaced birds will be accommodated within plantation woodland in the wider area. Furthermore, the number of birds affected is likely to represent only a very small proportion of the NHZ 5 populations of breeding crossbill species. The embedded mitigation described in Section 8.3.10 includes specific measures to avoid disturbance to breeding crossbill species. By following these, the risk of disturbance to breeding birds will be minimised.

As such, potential construction phase effects on the NHZ 5 crossbill species populations, which are considered to be IOFs of regional importance, are assessed as being of low magnitude and **not significant**.

Potential operation effects: It is generally considered that passerine species are not significantly impacted by wind farms³³. As noted above, the majority of crossbill nesting habitat currently present on Site will be retained, and will provide shelter from disturbance. Furthermore, it is expected that the level of human activity on Site during operational works will be infrequent and of limited extent (both spatially and temporally), with the only potential for disturbance during operation being if any works are planned within 150 m. In this event, relevant good practice measures described in Section 8.3.10.1 will be applied to ensure compliance with legislation protecting breeding Schedule 1 birds.

As such, potential operation phase effects on NHZ 5 populations of crossbill species, which are considered to be IOFs of regional importance, are assessed as being of negligible magnitude and **not significant**.

Potential decommissioning effects: These are considered likely to be of the same nature as construction effects. Therefore, following implementation of the embedded mitigation described in Section 8.3.10.1, potential effects during decommissioning on crossbill

¹³⁰ Wernham, C., Toms, M., Marchant, J., Clark, J., Siriwardena, G. & Baillie, S. (2002). *The Migration Atlas: Movements of the Birds of Britain and Ireland*. T. & A.D. Poyser Ltd.

species, which are considered to be IOFs of regional importance, are assessed as being of low magnitude and **not significant**.

8.6 CUMULATIVE EFFECT ASSESSMENT¹³¹

Cumulative effects can include direct habitat loss, disturbance, barrier effects and collision risk. The potential for the Development to make a material contribution to cumulative effects on IOFs is assessed below following NatureScot guidance³⁵.

Note that developments that have been refused or withdrawn were excluded from the assessment because, even if these applications are re-submitted, it is likely that the development layout and/or number of turbines, and hence potential effects on IOFs, will change and/or the development may never be consented. Proposed developments in planning but for which an application has not been submitted (i.e. those at the screening or scoping stage) were also excluded from the assessment because it is assumed that the number and design of turbines/infrastructure has not been finalised at this stage, and an assessment of effects on IOFs will not be publicly available.

8.6.1 Cumulative Habitat Loss

Direct habitat loss will include negligible amounts of foraging habitat for a limited number of species, and small amounts of habitat suitable for ground-nesting birds such as waders and potentially some raptors (although no raptor territories were located in areas of land-take). However, it is considered highly unlikely that habitat loss will result in the loss of breeding territories of any IOFs. Moreover, direct habitat loss will be offset by the habitat enhancements outlined in **Chapter 7: Ecology**, which are likely to improve habitat suitability for breeding waders such as curlew, and potentially ground-nesting raptors such as merlin and hen harrier. It is therefore highly unlikely that direct habitat loss resulting from construction of the Development will result in any potentially significant cumulative effects.

8.6.2 Cumulative Disturbance and Displacement

With the exception of common scoter and hen harrier, disturbance effects are predicted to be of low to negligible magnitude for all IOFs, with breeding waders the only group of IOFs predicted to be displaced. Of these, it was considered that, at worst, single pairs of lapwing, golden plover and dunlin, three pairs of snipe and four pairs of curlew could be displaced due to disturbance during construction. Based on the proportions of the regional breeding populations that would potentially be affected, it is considered that the level of impact on regional population will be so minimal that it would not result in any potentially significant cumulative effects.

Assessments of wader displacement are generally based on a 'worst-case scenario' and may therefore represent an overestimate. It is likely that at least some displaced birds will breed in the wider area, and some birds could potentially return to breed on or around a development site post-construction, particularly at those sites where habitat improvements have been completed/proposed to benefit breeding waders. These birds would therefore only be temporarily lost from the breeding population. Furthermore, as developments are at different phases of their life-cycle and most displacement is likely to occur during construction phase, the numbers of birds displaced annually will be relatively small.

Although potentially significant disturbance effects were predicted for breeding common scoter and hen harrier, specific mitigation to avoid this are proposed in Section 8.7.1 and, following implementation of these measures, there is not considered to be any potential for cumulative effects on either species.

¹³¹ Status of wind farms is as of 15 September 2020.

8.6.3 Cumulative Barrier Effects

It is considered that red-throated and black-throated divers are the only IOFs that could potentially be significantly affected by cumulative barrier effects, with any divers breeding to the east or south or of the Site, potentially having to fly around turbines to forage at the coast. The only wind farm development in the immediate vicinity of the Development is the proposed Drum Hollistan 2 Wind Farm¹³², which neighbours the Site to the north-east. Drum Hollistan 2 comprises seven turbines, the closest of which is over 500 m away from the Development. Assuming that Drum Hollistan 2 is consented¹³³ and built, and birds avoid flying through either development, it is considered likely that the separation distance between the two will be sufficient to allow breeding birds to fly between the two developments, along Giligill Burn and Gleann Creagach. Alternatively, depending on the breeding site, birds may fly around the Development to the south and west, e.g. following the Akran Burn. It is considered that the additional distance required to fly around rather than through the developments will be minor and unlikely to result in significant increases to daily energy costs.

As such, cumulative barrier effects on the Caithness and Sutherland Peatlands SPA and Ramsar site breeding red-throated and black-throated diver populations are assessed as being of low magnitude and **not significant**. No adverse effects on the integrity of the SPA and Ramsar site are predicted.

8.6.4 Cumulative Collision Risk

Due to their small population sizes, it was considered the Development could materially contribute to a potentially significant cumulative collision risk to two species, namely white-tailed eagle and peregrine. An assessment of cumulative collision risk to each of this species is presented below.

8.6.4.1 Cumulative Collision Risk to White-tailed Eagle

A search was made for information on predicted collision risk to white-tailed eagles from wind farms and other developments at all stages of development (operational, construction, consented and in planning) within NHZ 5. This included all developments in NHZ 5 listed in the NatureScot cumulative collision risk spreadsheet³⁷, a check of the Council Wind Turbine Mapping webpage¹³⁴ and a search of the Council ePlanning webpages¹³⁵. A summary of the results is presented in Table 8.16.

Table 8.16: Summary of Developments in NHZ5 Checked for Information Relating to Potential Cumulative Collision Risk to White-tailed Eagle

| Development name | No. of turbines | Development status ¹³⁶ | Predicted annual collision risk |
|-----------------------|-----------------|-----------------------------------|---------------------------------|
| Achairn Wind Farm | 3 | Operational | No information available |
| Achany Wind Farm | 19 | Operational | Not recorded |
| Achlachan Wind Farm | 5 | Operational | Not recorded |
| Achlachan 2 Wind Farm | 3 | Consented | Not recorded |
| Bad a' Cheò Wind Farm | 13 | Operational | Not recorded |
| Bad Fearn Wind Farm | 8 | In planning | Not recorded |

¹³²Status of wind farms is as of 15 September 2020.

¹³³Status of wind farms is as of 15 September 2020.

¹³⁴ <https://highland.maps.arcgis.com/apps/webappviewer/index.html?id=5ec04b13a9b049f798cadbd5055f1787> (Accessed 27/08/2020).

¹³⁵ <https://wam.highland.gov.uk/wam/> (Accessed 27/08/2020).

¹³⁶Status of wind farms is as of 15 September 2020.

| Development name | No. of turbines | Development status¹³⁶ | Predicted annual collision risk |
|--|------------------------|---|--|
| Berriedale and Dunbeath Community Wind Cluster | 3 | Consented | Not recorded |
| Bettyhill Wind Farm | 2 | Operational | No information available |
| Boulfruich Wind Farm | 15 | Operational | No information available |
| Braemore Wind Farm | 18 | Consented | Unknown - all species names redacted |
| Burn of Whilk Wind Farm | 9 | Operational | Not recorded |
| Camster Wind Farm | 25 | Operational | No information available |
| Camster II Wind Farm | 11 | In planning | Not recorded |
| Causeymire Wind Farm | 21 | Operational | No information available |
| Creag Riabhach Overhead Line | N/A | In planning | Not recorded |
| Creag Riabhach Wind Farm | 21 | Consented | Not recorded |
| Drum Hollistan 2 Wind Farm | 7 | In planning | Not recorded |
| Golticlay Wind Farm | 19 | In planning | Not recorded |
| Gordonbush Wind Farm | 35 | Operational | No information available |
| Gordonbush Wind Farm Extension | 15 | Consented | Not recorded |
| Halsary Wind Farm | 15 | Construction | Not recorded |
| Kilbraur Wind Farm | 19 | Operational | No information available |
| Kilbraur Wind Farm Extension | 8 | Operational | No information available |
| Lairg Wind Farm | 3 | Operational | No information available |
| Lairg 2 Wind Farm | 13 | In planning | 0.042 |
| Limekiln Wind Farm Resubmission | 24 | Consented | CRM not completed |
| Lower Swiney Farm Single Turbine | 1 | Operational | No information available |
| Remiggy Single Turbine | 1 | Operational | Not assessed |
| Rosehall Wind Farm | 19 | Operational | No information available |
| South Kilbraur Wind Farm | 7 | In planning | CRM not completed |
| Strathy North Wind Farm | 33 | Operational | No information available |
| Strathy North and South Overhead Line | N/A | Consented | Not recorded |

| Development name | No. of turbines | Development status ¹³⁶ | Predicted annual collision risk |
|-------------------------|-----------------|-----------------------------------|---------------------------------|
| Strathy South Wind Farm | 39 | Consented | No information available |
| Strathy Wood Wind Farm | 16 | Submitted | CRM not completed |
| West Clyth Wind Farm | 2 | Operational | Not recorded |

As can be seen from Table 8.16, the only development identified in NHZ 5 for which CRM was completed for white-tailed eagle, was Lairg 2 Wind Farm, which predicted an annual mortality rate of 0.042 birds, or 1.046 birds of the 25-year life span of the wind farm, much higher than the risk from the Development, which was predicted to be 0.007 collisions per year, or one bird every 136.111 years. Of the remaining 17 developments for which relevant information was available, white-tailed eagle was either not recorded or was recorded so rarely that CRM was not completed. Most of the 14 developments for which no relevant information was available are older developments that are now operational. It is considered unlikely that white-tailed eagle would have been identified as an IOF at risk of significant collision due to these developments because the species has only recently expanded its breeding range into NHZ 5, and levels of activity remain very low.

Although it is acknowledged that collision risk to this species from developments listed in Table 8.16 could increase in future if the population continues to expand in range and numbers, a larger population will be more resilient to potential effects, with the proportion that could be affected likely to be much lower in future. Furthermore, as was the case during Baseline Ornithology Surveys for the Development, white-tailed eagles recoded during surveys for Lairg 2 were generally first-year or sub-adult birds and are therefore likely to be transient individuals rather than part of the NHZ 5 breeding population.

As such, potential cumulative collision risk to the NHZ 5 white-tailed eagle population are assessed as being of low magnitude and **not significant**.

8.6.4.2 Cumulative Collision Risk to Peregrine

The assessment of cumulative collision risk to peregrine was based on the wind farms at all stages of development (operational, construction, consented and in planning) with potential connectivity to the North Caithness Cliffs SPA breeding population listed in the NatureScot cumulative collision risk spreadsheet³⁷. A search was also made for additional wind farms and other developments with potential connectivity to the SPA population using the Council Wind Turbine Mapping webpage¹³⁴ and the Council e-Planning webpages¹³⁵.

The only development identified with potential connectivity to the North Caithness Cliffs SPA was Drum Hollistan 2 Wind Farm, which neighbours the Development to the north-east. The predicted mean annual collision risk for this development was 0.014 birds, which is double that predicted for the Development (0.007 birds). Although a total of 0.021 birds equates to 1.05% of the SPA population (a single pair³⁷), this is still only one bird every 47 years. Given the very low collision risk and lack of reported peregrine collisions in the UK, combined with the fact that both developments are outwith the core foraging range for SPA birds, low levels of flight activity recorded at both developments and the expectation that activity levels are unlikely to change post-construction, cumulative collision risk to peregrine is predicted to be of negligible magnitude.

As such, potential cumulative collision effects on the North Caithness Cliffs SPA breeding peregrine population are assessed as being of low magnitude and **not significant**. No adverse effects on the integrity of the SPA are predicted.

8.7 MITIGATION, ENHANCEMENT AND MONITORING

8.7.1 Mitigation

Embedded mitigation is described in Section 8.3.10. Additional, specific mitigation to ensure that breeding common scoter and hen harrier (if present) are not disturbed is described in Appendix A8.5.

8.7.2 Habitat Enhancement

The proposed habitat restoration outlined in **Chapter 7: Ecology** is likely to benefit a number of IOFs, most notably breeding waders and raptors. Although some breeding birds using the Site following habitat restoration could be at increased risk of collision, this is predicted to be small and it is considered that the proposed habitat enhancements are likely to have a net positive effect on these species.

8.7.3 Monitoring

In order to determine how particular target species (common scoter, divers, raptors, waders and Arctic tern) are affected by the Development (including the proposed habitat restoration outlined in **Chapter 7: Ecology**), and how this compares to predicted effects, it is proposed that ornithological monitoring should take place during and post-construction. It is recommended that an Ornithological Monitoring Plan will be produced and secured via planning condition providing details of the methods and survey effort required. Annual surveys should include the following:

- Breeding common scoter surveys: a minimum of three survey visits to all suitable waterbodies within 500 m of the Development¹³⁷, following the method described in Gilbert *et al.* (1998)²⁶;
- Breeding diver surveys: a minimum of three survey visits to all suitable waterbodies within at least 1 km of the Site Boundary¹³⁸, following the method described in Gilbert *et al.* (1998)²⁶;
- Ground-nesting breeding raptor surveys: a minimum of four survey visits to identify any breeding hen harrier, merlin and short-eared owl territories within 1 km of the Development¹³⁷, following the methods described in Hardey *et al.* (2013)²⁷;
- Breeding wader surveys: four survey visits to identify breeding wader territories within 500 m of the Development¹³⁷, following the Brown & Shepherd (1993)⁵² method;
- Breeding Arctic tern checks: it is proposed that regular checks of the Arctic tern breeding site identified during the 2018 Moorland Breeding Bird Survey are completed during the course of other breeding season surveys, to record numbers of any breeding birds and monitor breeding success; and
- Breeding season collision monitoring: carcass searches, carcass persistence trials and observer efficiency trials should be completed at least once per month between March and August (inclusive) to determine whether actual bird collisions are in line with predicted values.

In line with NatureScot guidance¹³⁹, surveys should take place annually during construction, and after the Development becomes operational, during years 1-5, 10 and 15 as a minimum, with the requirement for further surveys to be determined based on previous survey results.

¹³⁷ Since the Core Survey Area used for the Baseline Ornithology Surveys did not cover the entire Development, it is proposed that the Monitoring Survey Area is instead based on the turbines and associated infrastructure.

¹³⁸ Since there is a potential for birds breeding in the wider

¹³⁹ NatureScot (2009) *Guidance on Methods for Monitoring Bird Populations at Onshore Wind Farms*. Guidance Note. NatureScot.

8.8 RESIDUAL EFFECTS

Following implementation of the mitigation measures described in Section 8.3.10 and Section 8.7, and specific mitigation to protect breeding common scoter and hen harrier is described in Appendix A8.5, **no significant** effects on any IOFs during any phase of the Development life cycle are predicted.

8.9 POTENTIAL EFFECTS ON STATUTORY SITES

8.9.1 *Habitats Regulations Appraisal Screening*

In accordance with the requirements of the Habitats Directives, where a project is likely to have a significant effect on an SPA (or any Natura 2000 Site) not directly connected with, or necessary to the nature conservation management of the SPA, that project shall be subject to Habitat Regulations Appraisal (HRA). This identifies any implications for the SPA in the respect of its conservation objectives.

As the Development is not associated with the management of any SPA with which there is potential connectivity, HRA screening is required. The intention of this screening is to assist the consenting authority in their assessment of the potential for likely significant effects on the integrity of the SPA. Should a likely significant effect be determined, an Appropriate Assessment (AA) must be completed a relevant competent authority. Additionally, the HRA screening constitutes an assessment of potential Development-related effects on SPAs and Ramsar sites in the context of EcIA.

There are three SPAs with potential connectivity to the Site, two of which are also Ramsar sites:

1. Caithness and Sutherland Peatlands SPA and Ramsar site;
2. North Caithness Cliffs SPA; and
3. Caithness Lochs SPA and Ramsar site.

Each of these sites is considered in turn below. Note that the screening assumes that the embedded mitigation described in Section 8.3.10 will be fully implemented.

8.9.1.1 *Caithness and Sutherland Peatlands SPA and Ramsar Site*

The south-eastern boundary of the Site is adjacent to the northern boundary of the Caithness and Sutherland Peatlands SPA and Ramsar site, which is designated for a number of upland breeding bird species (detailed in Table 8.7). It is considered possible that the Development could have a likely significant effect on the following qualifying interests of the SPA and Ramsar site:

- Breeding greylag goose (disturbance, displacement and collision risk);
- Breeding common scoter (disturbance and displacement);
- Breeding red-throated diver (disturbance, displacement, collision risk and barrier effects);
- Breeding black-throated diver (disturbance, displacement and barrier effects);
- Breeding hen harrier (disturbance and displacement and collision risk);
- Breeding golden plover (disturbance, displacement and collision risk);
- Breeding dunlin (disturbance and displacement); and
- Breeding merlin (disturbance, displacement and collision risk).

As the extent of habitat loss will be very small, with the majority considered sub-optimal for breeding and foraging birds, and levels of Site use were generally very low, no adverse effects on the integrity of any SPA or Ramsar site breeding populations are predicted. Other potential effects are considered below.

Disturbance of Breeding Birds

Breeding territories of red-throated diver, black-throated diver, merlin and potentially common scoter and hen harrier have been identified within 2 km of the Development, while territories of greylag goose, golden plover and dunlin have been identified within 500 m. It is also possible that these species could breed in closer proximity to the Development in future (i.e. within maximum species-specific disturbance buffers²⁸). All of these breeding species were within connectivity distance of the SPA. As a consequence, potential disturbance to breeding birds could occur, particularly during construction.

However, with the exception of common scoter and hen harrier, following full implementation of the embedded mitigation outlined in Section 8.3.10, there will be no adverse effects on the integrity of the SPA or Ramsar site breeding populations of these species due to disturbance.

Specific mitigation to ensure that breeding common scoter and hen harrier are not disturbed is detailed in Appendix A8.5. Following full implementation of this mitigation, there will be no adverse effects on the integrity of the SPA and Ramsar site breeding hen harrier population due to disturbance.

Displacement

It is possible that breeding birds identified above could be displaced due to disturbance during the construction phase. However, no adverse effects on the SPA and Ramsar site populations due to displacement during the operational phase is predicted. This is because birds would be choosing to nest in within or near the Development regardless of the presence of operational turbines, and it is expected that the level of human activity on Site during operational works will be infrequent and of limited extent (both spatially and temporally).

Greylag goose: Small numbers of greylag geese were potentially breeding in or around the Site during all survey years. Although none were within 500 m of the Development, it is possible that birds could breed within this area in future, which could result in disturbance of small numbers of birds. The embedded mitigation outlined in Section 8.3.10 will be fully implemented to ensure that all nesting birds, including greylag geese, are protected. In the unlikely event that birds are displaced, the numbers affected will be very low, and suitable breeding habitat is present in the surrounding area to support any displaced birds. As such, there will be no adverse effects on the integrity of the Ramsar site breeding greylag goose population due to displacement.

Common scoter: There is a single incidental record of this species (detailed in Appendix A8.5) and as suitable nesting habitat is present within 500 m⁶⁷ of the Site birds could potentially breed there, which could result in birds being displaced due to disturbance during construction. Consequently, without specific mitigation, it is possible that a pair of common scoter could be displaced, which could potentially affect the viability of the SPA population. However, following implementation of the embedded mitigation outlined in Section 8.3.10, combined with the specific mitigation detailed in Appendix A8.5, any breeding birds will be protected from disturbance (and hence displacement) and there will be no adverse effects on the integrity of the SPA and Ramsar site breeding common scoter population due to displacement.

Red-throated and black-throated divers: There is a historical red-throated diver nest site within 750 m⁶⁷ of the Development, although no evidence of successful breeding within the last ten years was identified (further details are presented in Appendix A8.5). No black-throated diver nest sites have been identified within 750 m⁶⁷ of the Development, but suitable nesting habitat is present within this area and it is possible that birds could breed there in future.

If either species breeds within 750 m⁶⁷ of the Development during construction, it is possible that they could be displaced due to disturbance. Both red-throated and black-throated divers are Schedule 1 species and the embedded mitigation outlined in Section 8.3.10 will be fully implemented to ensure that breeding birds are protected from any disturbance (and hence displacement). Therefore, there will be no adverse effects on the SPA and Ramsar site breeding populations of red-throated or black-throated diver due to displacement.

Hen harrier: A possible nest site was identified within the Breeding Raptor Survey Area and birds could potentially breed within 750 m⁶⁷ of the Site during construction, which could result in birds being displaced due to disturbance. Consequently, without specific mitigation, it is possible that a pair of breeding hen harriers could be displaced, which could potentially affect the viability of the SPA population. However, following implementation of the embedded mitigation outlined in Section 8.3.10, combined with the specific mitigation detailed in Appendix A8.5, any breeding birds will be protected from disturbance (and hence displacement) and there will be no adverse effects on the integrity of the SPA and Ramsar site breeding hen harrier population due to displacement.

Golden plover and dunlin: As a 'worst-case scenario', it is predicted that construction of the Development could result in the displacement of a single pair of both golden plover and dunlin (breeding within 500 m). However, the number of birds that will potentially be affected is very low, and suitable breeding habitat for both species is present in the surrounding area (such as the adjacent Caithness and Sutherland Peatlands SPA) to support any displaced birds. As such, based on the size of the SPA populations (3,844 golden plover and 2,732 dunlin³⁷) there will be no adverse effects on the integrity of the SPA and Ramsar site breeding golden plover or dunlin populations due to displacement.

Merlin: No nest sites within 500 m⁶⁷ of the Development were identified, but it is possible that birds could breed within this area in future. If this occurs site during construction, it is possible that birds could be displaced due to disturbance. Merlin is a Schedule 1 species and the embedded mitigation outlined in Section 8.3.10 will be fully implemented to ensure that breeding birds are protected from any disturbance (and hence displacement). Therefore, there will be no adverse effect on the integrity of the SPA and Ramsar site breeding merlin population due to displacement.

Barrier Effects

Red-throated and black-throated divers were considered to be the only IOFs that could potentially be affected by barrier effects, which could potentially result in birds being displaced from breeding sites to the east or south of the Development, or failing to breed due to large increased in energy expenditure as a result of having to make significant detours to avoid flying through the Development and potentially the adjacent Drum Hollistan 2 Wind Farm.

However, if divers do avoid flying through the Development, it is considered likely that any birds breeding at sites to the east would be able to follow a relatively direct flight path around the eastern edge of the Site to reach the coast, even if the adjacent proposed Drum Hollistan 2 Wind Farm is consented and constructed (because it is considered that the separation distance between the two developments will be sufficient to allow breeding birds to fly between them). Any birds breeding at sites to the south may instead fly around the western side of the Development, but would still be able to follow a relatively straight flight path to reach the coast. It is considered that the additional distance required to fly around the Development rather than through it will be minor and unlikely to result in significant increases to daily energy costs. Therefore, there will be no adverse effect on the integrity of the SPA and Ramsar site breeding red-throated and black-throated diver populations due to barrier effects (either from the Development alone or cumulatively with the neighbouring Drum Hollistan 2 Wind Farm).

Collision Risk

Breeding greylag goose, red-throated diver, hen harrier, golden plover and merlin were the only SPA species for which flight activity was sufficient for there to potentially be a likely significant effect resulting from collision risk. However, CRM was completed for all of these species and in all cases was predicted to be low (ranging from an annual mean of 0.005 breeding hen harrier collisions to 0.026 breeding greylag goose collisions). Due to the very low collision risks, which would affect a very small proportion of the SPA and Ramsar site breeding populations, no adverse effects on the integrity of the SPA and Ramsar site due to collision risk are predicted.

8.9.1.2 North Caithness Cliffs SPA

The Site is located approximately 1.5 km to the south of the North Caithness Cliffs SPA (with the Development itself located just over 2 km away). The SPA is designated for a number of breeding seabird species (detailed in Table 8.7) and breeding peregrine.

As the extent of foraging habitat loss will be very small, and no birds were breeding within potential disturbance range²⁸, no likely significant effects on the integrity of the SPA breeding peregrine population as a result of habitat loss or disturbance/displacement are predicted.

It is possible that the Development could have a likely significant effect on the SPA breeding peregrine population due to collision risk, either due to the Development alone or cumulatively with the Drum Hollistan 2 Wind Farm, which borders the Site to the north-east. It was predicted that the mean collision risk to breeding peregrine from the Development would be 0.007 birds annually, while a further 0.014 collisions were predicted at the adjacent Drum Hollistan 2 Wind Farm.

As the SPA breeding peregrine population is very small (a single pair³⁷), a total of 0.021 birds equates to 1.05% of the SPA population. However, this is still less than one bird every 46 years. Based on the very low collision risk and lack of reported peregrine collisions in the UK, combined with the fact that both developments are outwith the core foraging range of SPA birds, low levels of flight activity recorded at both developments and the fact that activity levels are unlikely to change post-construction, collision risk to peregrine from the Development alone or cumulatively with the Drum Hollistan 2 Wind Farm is predicted to be negligible. As such, no adverse effect on the integrity of the North Caithness Cliffs SPA breeding peregrine population due to collision risk are predicted.

8.9.1.3 Caithness Lochs SPA and Ramsar Site

As detailed in Table 8.7, the Site is located approximately 10.1 km to the north-west of the closest loch forming part of the Caithness Lochs SPA and Ramsar site, which is designated for non-breeding greylag goose, Greenland white-fronted goose and whooper swan. It is possible that the Development could have a likely significant effect on the greylag goose population.

The extent of habitat loss will be very small, and sub-optimal for foraging greylag geese. Furthermore, the Site is not located within the core foraging areas used by greylag geese from the SPA and foraging geese were only occasionally recorded and always in relatively low numbers. Therefore, no likely significant effect on the integrity of the SPA and Ramsar site due to disturbance or displacement of non-breeding (foraging) birds is predicted.

However, flight activity was sufficient for there to potentially be a likely significant effect on non-breeding greylag goose resulting from collision risk. CRM was therefore completed for this species and predicted an annual collision risk 0.007 birds during the non-breeding season, which equates to 0.0001% of the SPA population (10,488 individuals⁷⁶). As such, no adverse effect on the integrity of the Caithness Lochs SPA and Ramsar site non-breeding greylag goose population due to collision risk are predicted.

8.9.2 *Potential Effects on Sites of Special Scientific Interest*

Two SSSIs with potential connectivity with the Site were identified, both of which are components of the Caithness and Sutherland Peatlands SPA:

- East Halladale SSSI: designated for breeding golden plover and dunlin, as well as its breeding bird assemblage; the northern boundary of the SSSI is adjacent to the south-eastern boundary of the Site; and
- West Halladale SSSI: designated for breeding common scoter and black-throated diver, as well as its breeding bird assemblage; located approximately 2.7 km to the south-west of the Site.

Following full implementation of the embedded mitigation detailed in Section 8.3.10 **no significant** effects on any of the qualifying interests of either SSSI is predicted and no adverse effects on the integrity of either site are predicted.

8.10 STATEMENT OF SIGNIFICANCE

An assessment has been made of the potential for significant effects of the Development on IOFs. By implementing the embedded measures detailed in Section 8.3.10 and the specific mitigation for hen harrier described in Appendix A8.5, and following best practice guidance during construction, the magnitude of effects of the Development on IOFs both alone and in combination with other schemes are assessed as being of low to negligible magnitude, and thus **non-significant** in terms of the EIA Regulations.

Table 8.17 provides a summary of the effects detailed within this chapter.

Table 8.17: Summary of Effects

| IOF* | Potential Effect | Significance of Effect | Mitigation Proposed | Residual Effect |
|---------------------------|--------------------------|------------------------|--------------------------------|-----------------|
| Construction Phase | | | | |
| Greylag goose | Habitat loss | Not significant | N/A | Not significant |
| | Disturbance/displacement | Not significant | N/A | Not significant |
| Common scoter | Habitat loss | Not significant | N/A | Not significant |
| | Disturbance/displacement | Significant | Yes; detailed in Appendix A8.5 | Not significant |
| Red-throated diver | Habitat loss | Not significant | N/A | Not significant |
| | Disturbance/displacement | Not significant | N/A | Not significant |
| Black-throated diver | Habitat loss | Not significant | N/A | Not significant |
| | Disturbance/displacement | Not significant | N/A | Not significant |
| Osprey | Habitat loss | Not significant | N/A | Not significant |
| | Disturbance/displacement | Not significant | N/A | Not significant |
| Golden eagle | Habitat loss | Not significant | N/A | Not significant |
| | Disturbance/displacement | Not significant | N/A | Not significant |
| Hen harrier | Habitat loss | Not significant | N/A | Not significant |

| IOF* | Potential Effect | Significance of Effect | Mitigation Proposed | Residual Effect |
|-----------------------------|--|-------------------------------|-----------------------------------|------------------------|
| | Disturbance/ displacement | Significant | Yes; detailed in Appendix A8.5 | Not significant |
| White-tailed eagle | Habitat loss | Not significant | N/A | Not significant |
| | Disturbance/ displacement | Not significant | N/A | Not significant |
| Lapwing | Habitat loss | Not significant | N/A | Not significant |
| | Disturbance/ displacement | Not significant | N/A | Not significant |
| Golden plover | Habitat loss | Not significant | N/A | Not significant |
| | Disturbance/ displacement | Not significant | N/A | Not significant |
| Curlew | Habitat loss | Not significant | N/A | Not significant |
| | Disturbance/ displacement | Not significant | N/A | Not significant |
| Dunlin | Habitat loss | Not significant | N/A | Not significant |
| | Disturbance/ displacement | Not significant | N/A | Not significant |
| Snipe | Habitat loss | Not significant | N/A | Not significant |
| | Disturbance/ displacement | Not significant | N/A | Not significant |
| Greenshank | Habitat loss | Not significant | N/A | Not significant |
| | Disturbance/ displacement | Not significant | N/A | Not significant |
| Arctic tern | Habitat loss | Not significant | N/A | Not significant |
| | Disturbance/ displacement | Not significant | N/A | Not significant |
| Short-eared owl | Habitat loss | Not significant | N/A | Not significant |
| | Disturbance/ displacement | Not significant | N/A | Not significant |
| Merlin | Habitat loss | Not significant | N/A | Not significant |
| | Disturbance/ displacement | Not significant | N/A | Not significant |
| Peregrine | Habitat loss | Not significant | N/A | Not significant |
| | Disturbance/ displacement | Not significant | N/A | Not significant |
| Crossbill species | Habitat loss | Not significant | N/A | Not significant |
| | Disturbance/ displacement | Not significant | N/A | Not significant |
| Caithness and Sutherland | Disturbance to/ displacement of qualifying interests | Significant | Yes; detailed in Appendix A8.5 | Not significant |

| IOF* | Potential Effect | Significance of Effect | Mitigation Proposed | Residual Effect |
|-------------------------------------|---|------------------------|--------------------------------|-----------------|
| Peatlands SPA and Ramsar Site | | | | |
| North Caithness Cliffs SPA | Disturbance to/displacement of qualifying interests | Not significant | N/A | Not significant |
| Caithness Lochs SPA and Ramsar site | Disturbance to/displacement of qualifying interests | Not significant | N/A | Not significant |
| East Halladale SSSI | Disturbance to/displacement of qualifying interests | Not significant | N/A | Not significant |
| West Halladale SSSI | Disturbance to/displacement of qualifying interests | Significant | Yes; detailed in Appendix A8.5 | Not significant |
| Operational Phase | | | | |
| Greylag goose | Disturbance/displacement | Not significant | N/A | Not significant |
| | Collision risk | Not significant | N/A | Not significant |
| Common scoter | Disturbance/displacement | Not significant | N/A | Not significant |
| | Collision risk | Not significant | N/A | Not significant |
| Red-throated diver | Disturbance/displacement | Not significant | N/A | Not significant |
| | Collision risk | Not significant | N/A | Not significant |
| | Barrier effects | Not significant | N/A | Not significant |
| | Cumulative barrier effects | Not significant | N/A | Not significant |
| Black-throated diver | Disturbance/displacement | Not significant | N/A | Not significant |
| | Collision risk | Not significant | N/A | Not significant |
| | Barrier effects | Not significant | N/A | Not significant |
| | Cumulative barrier effects | Not significant | N/A | Not significant |
| Osprey | Disturbance/displacement | Not significant | N/A | Not significant |
| | Collision risk | Not significant | N/A | Not significant |
| Golden eagle | Disturbance/displacement | Not significant | N/A | Not significant |
| | Collision risk | Not significant | N/A | Not significant |
| Hen harrier | Disturbance/displacement | Not significant | N/A | Not significant |
| | Collision risk | Not significant | N/A | Not significant |

| IOF* | Potential Effect | Significance of Effect | Mitigation Proposed | Residual Effect |
|--------------------|---------------------------|-------------------------------|----------------------------|------------------------|
| White-tailed eagle | Disturbance/displacement | Not significant | N/A | Not significant |
| | Collision risk | Not significant | N/A | Not significant |
| | Cumulative collision risk | Not significant | N/A | Not significant |
| Lapwing | Disturbance/displacement | Not significant | N/A | Not significant |
| | Collision risk | Not significant | N/A | Not significant |
| Golden plover | Disturbance/displacement | Not significant | N/A | Not significant |
| | Collision risk | Not significant | N/A | Not significant |
| Curlew | Disturbance/displacement | Not significant | N/A | Not significant |
| | Collision risk | Not significant | N/A | Not significant |
| Dunlin | Disturbance/displacement | Not significant | N/A | Not significant |
| | Collision risk | Not significant | N/A | Not significant |
| Snipe | Disturbance/displacement | Not significant | N/A | Not significant |
| | Collision risk | Not significant | N/A | Not significant |
| Greenshank | Disturbance/displacement | Not significant | N/A | Not significant |
| | Collision risk | Not significant | N/A | Not significant |
| Arctic tern | Disturbance/displacement | Not significant | N/A | Not significant |
| | Collision risk | Not significant | N/A | Not significant |
| Short-eared owl | Disturbance/displacement | Not significant | N/A | Not significant |
| | Collision risk | Not significant | N/A | Not significant |
| Merlin | Disturbance/displacement | Not significant | N/A | Not significant |
| | Collision risk | Not significant | N/A | Not significant |
| Peregrine | Disturbance/displacement | Not significant | N/A | Not significant |
| | Collision risk | Not significant | N/A | Not significant |
| | Cumulative collision risk | Not significant | N/A | Not significant |
| Crossbill species | Disturbance/displacement | Not significant | N/A | Not significant |

| IOF* | Potential Effect | Significance of Effect | Mitigation Proposed | Residual Effect |
|--|--|------------------------|--------------------------------|-----------------|
| Caithness and Sutherland Peatlands SPA and Ramsar Site | Disturbance to/ displacement of qualifying interests | Not significant | N/A | Not significant |
| | Collision risk to qualifying interests | Not significant | N/A | Not significant |
| | Barrier effects to qualifying interests | Not significant | N/A | Not significant |
| | Cumulative barrier effects to qualifying interests | Not significant | N/A | Not significant |
| North Caithness Cliffs SPA | Disturbance to/ displacement of qualifying interests | Not significant | N/A | Not significant |
| | Collision risk to qualifying interests | Not significant | N/A | Not significant |
| | Cumulative collision risk to qualifying interests | Not significant | N/A | Not significant |
| Caithness Lochs SPA and Ramsar site | Disturbance to/ displacement of qualifying interests | Not significant | N/A | Not significant |
| | Collision risk to qualifying interests | Not significant | N/A | Not significant |
| East Halladale SSSI | Disturbance to/ displacement of qualifying interests | Not significant | N/A | Not significant |
| | Collision risk to qualifying interests | Not significant | N/A | Not significant |
| West Halladale SSSI | Disturbance to/ displacement of qualifying interests | Significant | Yes; detailed in Appendix A8.5 | Not significant |
| | Collision risk to qualifying interests | Not significant | N/A | Not significant |
| | Barrier effects to qualifying interests | Not significant | N/A | Not significant |
| | Cumulative barrier effects to qualifying interests | Not significant | N/A | Not significant |
| Decommissioning Phase | | | | |
| Caithness and Sutherland Peatlands SPA and Ramsar Site | Disturbance/ displacement | Significant | Yes; detailed in Appendix A8.5 | Not significant |
| North Caithness Cliffs SPA | Disturbance/ displacement | Not significant | N/A | Not significant |

| IOF* | Potential Effect | Significance of Effect | Mitigation Proposed | Residual Effect |
|-------------------------------------|--------------------------|-------------------------------|--------------------------------|------------------------|
| Caithness Lochs SPA and Ramsar site | Disturbance/displacement | Not significant | N/A | Not significant |
| East Halladale SSSI | Disturbance/displacement | Not significant | N/A | Not significant |
| West Halladale SSSI | Disturbance/displacement | Significant | Yes; detailed in Appendix A8.5 | Not significant |
| Greylag goose | Disturbance/displacement | Not significant | N/A | Not significant |
| Common scoter | Disturbance/displacement | Significant | Yes; detailed in Appendix A8.5 | Not significant |
| Red-throated diver | Disturbance/displacement | Not significant | N/A | Not significant |
| Black-throated diver | Disturbance/displacement | Not significant | N/A | Not significant |
| Osprey | Disturbance/displacement | Not significant | N/A | Not significant |
| Golden eagle | Disturbance/displacement | Not significant | N/A | Not significant |
| Hen harrier | Disturbance/displacement | Significant | Yes; detailed in Appendix A8.5 | Not significant |
| White-tailed eagle | Disturbance/displacement | Not significant | N/A | Not significant |
| Lapwing | Disturbance/displacement | Not significant | N/A | Not significant |
| Golden plover | Disturbance/displacement | Not significant | N/A | Not significant |
| Curlew | Disturbance/displacement | Not significant | N/A | Not significant |
| Dunlin | Disturbance/displacement | Not significant | N/A | Not significant |
| Snipe | Disturbance/displacement | Not significant | N/A | Not significant |
| Greenshank | Disturbance/displacement | Not significant | N/A | Not significant |
| Arctic tern | Disturbance/displacement | Not significant | N/A | Not significant |
| Short-eared owl | Disturbance/displacement | Not significant | N/A | Not significant |
| Merlin | Disturbance/displacement | Not significant | N/A | Not significant |
| Peregrine | Disturbance/displacement | Not significant | N/A | Not significant |

| IOF* | Potential Effect | Significance of Effect | Mitigation Proposed | Residual Effect |
|---|--|-------------------------------|-----------------------------------|------------------------|
| Crossbill species | Disturbance/ displacement | Not significant | N/A | Not significant |
| Caithness and Sutherland Peatlands SPA and Ramsar Site | Disturbance to/ displacement of qualifying interests | Significant | Yes; detailed in Appendix A8.5 | Not significant |
| North Caithness Cliffs SPA | Disturbance to/ displacement of qualifying interests | Not significant | N/A | Not significant |
| Caithness Lochs SPA and Ramsar site | Disturbance to/ displacement of qualifying interests | Not significant | N/A | Not significant |
| East Halladale SSSI | Disturbance to/ displacement of qualifying interests | Not significant | N/A | Not significant |
| West Halladale SSSI | Disturbance to/ displacement of qualifying interests | Significant | Yes; detailed in Appendix A8.5 | Not significant |
| * Species names and order in which they are listed follow the British List maintained by the BOU ¹ | | | | |