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Environmental Impact Assessment Report

Swarclett Wind Farm

Technical Appendix 6-5: Shadow Habitats Regulations Appraisal (sHRA)

Swarclett Wind Energy Limited

wind2

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1 Introduction and background

This Technical Appendix has been produced to support Chapter 6: Ecology and Chapter 7: Ornithology of the Environmental Impact Assessment Report (EIAR) for Swarclett Wind Farm (the Proposed Development). It undertakes a shadow Habitats Regulations Appraisal for the Proposed Development. It addresses the presence of three Special Areas of Conservation (SAC) and three Special Protection Areas (SPA) within the vicinity of the Proposed Development, summarising the information with respect to the SAC/SPAs and the respective qualifying features of the SAC/SPAs.

In Article 6(3) of the EC Council Directive (92/43/EEC), on the conservation of natural habitats and of wild fauna and flora – The Habitats Directive, any project or plan which is not directly connected with or necessary to the management of a European site but would be likely to have a significant effect either alone or in combination with other plans or projects shall be subject to an Appropriate Assessment of its implications for the European site in view of that site's conservation objectives. In light of the findings and subject to the provisions of Article 6(4) of the Habitats Directive, the Competent Authority shall agree to the plan or project only after ensuring that it will not affect the integrity of the European site. Whilst mitigation may be taken into account at the Appropriate Assessment stage, it is not to be considered when initially screening the project in order to determine whether or not an Appropriate Assessment is needed.

Article 6(4) makes provision that if a negative assessment is made of the implications of the project on the European site, and in the absence of other alternative solutions, the plan or project can go ahead for imperative reasons of overriding interest but that compensatory measures must be taken to ensure that the overall coherence of the European site is protected/maintained. A distinction is to be drawn between mitigation and compensation.

Since this is a project, as defined by the Habitats Directive, and transposed into Scottish law by the Conservation (Natural Habitats, &c.) Regulations 1994, which is not directly connected with or necessary to the management of any nearby European sites, then a Habitats Regulations Appraisal (HRA) will be required. This will be carried out by the Competent Authority, advised by the Statutory Nature Conservation Body. The recent departure of the UK from the European Union has not altered this requirement; it is still a requirement under Scots law.

The purpose of this report, which has been commissioned by Swarclett Wind Energy Ltd. to support the planning application, is to carry out a shadow HRA, for discussion with the Competent Authority and Statutory Nature Conservation Body. To do this, three stages of assessment will be carried out:

- Screening – is there a likely significant effect on the SAC/SPAs as a result of the project?
- Appropriate Assessment
- Finalisation of shadow HRA

1.1 Background

1.1.1 Site Location and Description

1.1.2 European Sites

A review of European designated sites (Special Areas of Conservation (SACs) or Special Protection Areas (SPAs)) was carried out within 2km of the Proposed Development, extending to 10km for sites designated for avian or aquatic migratory species, and 20km for sites with geese as a qualifying interest as a result of NatureScot guidance on connectivity (NatureScot, 2016).

The results of this review are shown in Table 6-5-1 and on Figure 7-1 (EIA Report Volume 4).

Table 6-5-1: European sites

Site Name	Designation	Distance from Proposed Development	Qualifying features
Caithness Lochs	SPA	2.3km (Loch Scarmclate); also Loch Watten (4.1km) and Loch Heilan (6.0km). Other constituent parts beyond these distances.	• Greenland white-fronted goose *Anser albifrons flavirostris* – winter peak mean of 440 representing 3% of GB population, 1% of Greenlandic population (1993/1994 – 1997/1998) [iv] • Greylag goose *Anser anser* – winter peak mean of 7,190 representing 7% of GB and Icelandic populations (1993/1994 – 1997/1998) [iv] • Whooper swan *Cygnus cygnus* – winter peak mean of 240 representing 4% of GB population, 1% of Icelandic population (1993/1994 – 1997/1998)[iv]
Loch Watten	SAC	4.1km	• Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation
North Caithness Cliffs	SPA	5.8km	• Peregrine *Falco peregrinus* – 6 pairs representing 0.5% of GB population [iii] • Guillemot *Uria aalge* – 38,300 individuals representing 1% of the North Atlantic biogeographic population and 4% of GB population (1985 – 1987) [iii] • Fulmar *Fulmarus glacialis* – 14,700 pairs representing 3% of GB population (1985 – 1987) [iii] • Kittiwake *Rissa tridactyla* – 13,100 pairs representing 3% of GB population (1985 – 1987) [iii] • Razorbill *Alca torda* – 4,000 individuals representing 3% of GB population (1985 – 1987) [iii] • Puffin *Fratercula arctica* – 2,080 pairs representing 0.4% of GB population and greater than 2,000 individuals (1985 – 1987) [iii]

Site Name	Designation	Distance from Proposed Development	Qualifying features
			Seabird assemblage – 110,000 individuals (1985 – 1987) [iii]
River Thurso	SAC	6km	Atlantic salmon *Salmo salar*
Caithness and Sutherland Peatlands	SAC	8km	Habitats: • Blanket bogs • Depressions on peat substrates • Acid peat-stained lakes and ponds • Wet heathland with cross-leaved heath *Erica tetralix* • Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels • Transition mires and quaking bogs Species: • Otter *Lutra lutra* • Marsh saxifrage *Saxifraga hirculus*
Caithness and Sutherland Peatlands	SPA	8km	• Black-throated diver *Gavia arctica* – 26 pairs representing 16.3% of GB population [i](17 pairs [ii]) • Golden eagle *Aquila chrysaetos* – 5 pairs representing 1.3% of GB population [i] (5 pairs [ii]) • Golden plover *Pluvialis apricaria* – 1064 pairs representing 4.7% of GB population [i] (1922 pairs [ii]) • Hen harrier *Circus cyaneus* – 14 pairs representing 2.8% of GB population [i] (18 pairs [ii]) • Merlin *Falco columbarius* – 54 pairs representing 4.2% of GB population [i] (54 pairs [ii]) • Red-throated diver *Gavia stellata* – 89 pairs representing 9.5% of GB population [i] (46 pairs [ii]) • Short-eared owl *Asio flammeus* – 30 pairs representing 3% of GB population [i] (30 pairs [ii]) • Wood sandpiper *Tringa glareola* – 5 pairs representing 50% of GB population [i] (6 pairs [ii]) • Common scoter *Melanitta nigra* – 27 pairs representing <0.1% of Western Siberian/ Western & Northern Europe/North-western Africa population [i] (26 pairs [ii]) • Dunlin *Calidris alpina schinzii* – 1860 pairs representing 16.9% of the Baltic/UK/ Ireland population [i] (1366 pairs [ii]) • Greenshank *Tringa nebularia* – 54 pairs representing 0.4% of the Europe/Western Africa population [i] (653 pairs [ii])

Site Name	Designation	Distance from Proposed Development	Qualifying features
			• Wigeon *Mareca penelope* – 43 pairs representing <0.1% of Western Siberian / North-western/North-eastern Europe population [i] (43 pairs [ii])

[i] 2001 Population Estimate (SNH, 2017)

[ii] 2007/2009 Most Recent Population Estimate

[iii] Figure from SPA citation (SNH, 2018)

[Iv] Figure from SPA citation (SNH, 1999)

Conservation Objectives

For each designated site, conservation objectives (CO) have been set. It is the maintenance of these conservation objectives which ensures the integrity of the European site and as such, consideration of whether these conservation objectives will continue to be met if the Proposed Development proceeds is a key assessment to be made. Typically, SPAs have similar conservation objectives, while SACs have conservation objectives tied into their qualifying features and the status of those qualifying features.

For SPAs (i.e. Caithness Lochs SPA, North Caithness Cliffs SPA and Caithness and Sutherland Peatlands SPA) the conservation objectives are:

- To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and
- To ensure for the qualifying species that the following are maintained in the long term:
  - Population of the species is a viable component of the site;
  - Distribution of the species within the site;
  - Distribution and extent of habitats supporting the species;
  - Structure, function and supporting processes of habitats supporting the species; and
  - No significant disturbance of the species.

For Loch Watten the conservation objectives (in summary) are:

- To ensure that the qualifying feature of Loch Watten SAC is in favourable condition and makes an appropriate contribution to achieving favourable conservation status; and
- To ensure that the integrity of Loch Watten SAC is restored by meeting objectives 2a, 2b and 2c for the qualifying feature.
  - Maintain the extent and distribution of the naturally nutrient-rich lakes or lochs which are often dominated by pondweed habitat within the site;
  - Restore the structure, function and supporting processes of the naturally nutrient-rich lakes or lochs which are often dominated by pondweed habitat; and
  - Restore the distribution and viability of typical species of the naturally nutrient rich lakes or lochs which are often dominated by pondweed habitat.

For River Thurso SAC, the conservation objectives (in summary) are:

- To ensure that the qualifying feature of the River Thurso SAC is in favourable condition and makes an appropriate contribution to achieving favourable conservation status; and
- To ensure that the integrity of the River Thurso SAC is restored by meeting objectives 2a, 2b and 2c for Atlantic salmon.
  - Restore the population of Atlantic salmon, including range of genetic types, as a viable component of the site;
  - Restore the distribution of Atlantic salmon throughout the site; and
  - Restore the habitats supporting Atlantic salmon within the site and availability of food.

For Caithness and Sutherland Peatlands SAC, the conservation objectives are set out in Table 6-5-2.

Table 6-5.2: Conservation objectives for Caithness and Sutherland Peatlands SAC

Qualifying feature	CO 2a	CO 2b	CO2c
Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels	Maintain the extent and distribution of the 'clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels' habitat within the site.	Restore the structure, function and supporting processes of 'clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels' habitat.	Restore the distribution and viability of typical species of the 'clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels' habitat.
Acid peat-stained lakes and ponds (also known as 'dubh lochans')	Maintain the extent and distribution of the acid peat-stained lakes and ponds (also known as dubh lochans) within the site.	Maintain the structure, function and supporting processes of the acid peat-stained lakes and ponds (also known as dubh lochans).	Maintain the distribution and viability of typical species of the acid-peat stained lakes and ponds (also known as dubh lochans).
Wet heathland with cross-leaved heath	Maintain the extent and distribution of the wet heathland with cross-leaved heath habitat within the site.	Restore the structure, function and supporting processes of the wet heathland with cross-leaved heath habitat.	Restore the distribution and viability of typical species of wet heathland with cross-leaved heath.
Blanket bog	Maintain the extent and distribution of blanket bog within the site.	Restore the structure, function and supporting processes of the blanket bog habitat.	Restore the distribution and viability of typical species of the blanket bog habitat.
Very wet mires often identified by unstable 'quaking' surface.	Maintain the extent and distribution of the very wet mires often identified by an unstable 'quaking' surface (also known as ladder fen) within the site.	Restore the structure, function and supporting processes of the very wet mires often identified by unstable 'quaking' surface (also known as ladder fen'.	Restore the distribution and viability of typical species of the very wet mires often identified by unstable 'quaking' surface (also known as ladder fen).
Depressions on peat substrates	Maintain the extent and distribution of the	Restore the structure, function and	Maintain the distribution and

Qualifying feature	CO 2a	CO 2b	CO2c
	depressions on peat substrates habitat within the site.	supporting processes of the depressions on peat substrates habitat.	viability of typical species of the depressions on peat substrates habitat.
Otter *Lutra lutra*	Restore the population of otter as a viable component of the site	Maintain the distribution of otter throughout the site.	Maintain the habitats supporting otter within the site and availability of food.
Marsh saxifrage *Saxifraga hirculus*	Maintain the population of marsh saxifrage as a viable component of the site.	Maintain the distribution of marsh saxifrage throughout the site.	Maintain the habitats supporting marsh saxifrage within the site.

1.2 Proposed Development

Full details of the Proposed Development are provided in Chapter 3: Description of Development. The Proposed Development will consist of up two three-bladed horizontal axis wind turbines, each up to 149.9 m above ground level (agl) maximum blade tip height and a rotor diameter of 133 m, allowing a total output of approximately 9.6MW. The final choice of turbine will be subject to a selection process which considers technical and commercial aspects of the turbines and would be based on the turbine models which are commercially available at the time of construction.

Additionally there will be 12MW of battery storage installed, comprising an area of 287m^2. Up to three storage units are anticipated, each being 12.2m x 2.4 m with a height of up to 2.6m. It is proposed that these units could be double stacked and therefore be up to 5.2m high.

Associated infrastructure includes hard standing areas for erecting cranes at each turbine location, on-site access tracks and turning heads, an on-site substation and control building, and a temporary construction compound. The Proposed Development would be time limited to 30 years from the date of final commission.

2 Screening of Likely Significant Effects

This section describes in turn the presence or absence of qualifying species or habitats within the Proposed Development and vicinity and assesses whether there are any likely significant effects upon those features.

2.1 Caithness Lochs SPA

Three of the constituent parts of the SPA lie within 6km of the Proposed Development; Loch Scarmclate, Loch Watten and Loch Heilan. The closest, Loch Scarmclate, lies 2.3km from the Proposed Development.

Table 6-5-3 shows the non-breeding season disturbance distances for the three qualifying species taken from guidance (Goodship & Furness, 2022).

Table 6-5-3: Disturbance distances of qualifying species (taken from Goodship & Furness 2022)

Species	Non-breeding season disturbance
Greenland White-fronted goose	500-1000m
Greylag goose	200-600m
Whooper swan	200-600m

There were no observations of Greenland White-fronted goose in the survey area during any survey. As a result, impacts on this species are screened out.

Table 6-5-3 shows that for Greylag goose and Whooper swan roosting within the SPA, there would be no likely significant effects on birds within the SPA as the Proposed Development lies too far from the roost locations to cause disturbance or displacement.

However, for Greylag goose and Whooper swan interacting with the wider environment outwith the SPAs there is potential for likely significant effects. Collison risk could increase mortality for both species which could mean the population would not be maintained and as such this is considered a likely significant effect that would need further assessment via appropriate assessment.

Additionally, since both Greylag goose and Whooper swans forage across a wider area, there is potential for displacement which could reduce/limit access to feeding areas. This too would be considered a likely significant effect requiring further assessment via appropriate assessment.

Finally, the Proposed Development could operate as a barrier to Greylag goose and Whooper swans accessing the SPA roosts and so barrier effects will also be considered in the appropriate assessment.

2.2 Loch Watten SAC

Loch Watten lies 4.1km from the Proposed Development and is designated as a natural eutrophic waterbody with *Magnopotamion* or *Hydrocharition*-type vegetation.

Given the distance between the Proposed Development and the SAC, construction and operational activities on the Proposed Development Site will not create any adverse impacts on the SAC. Importantly, there is no hydrological connectivity

between the Proposed Development Site and the SAC, as the Proposed Development Site drains to the north, draining by way of ditches into the Burn of Durran which enters the Pentland Firth at Castleford.

As a result, there is no pathway for the Proposed Development to affect the SAC and as such, there are no likely significant effects identified of the Proposed Development on the SAC.

TheShadow Habitats Regulations Appraisal (sHRA) for this site can therefore be concluded with a finding that the Proposed Development can proceed without adverse effect on the integrity of the Loch Watten SAC and the conservation objectives for this site would be maintained.

2.3 North Caithness Cliffs SPA

North Caithness Cliffs has been designated for a number of cliff breeding species Table 6-5-1). It lies 5.8km north of the Proposed Development.

All but one of the species (Peregrine) are marine species, feeding at sea and coming only to land to breed and as such, there would be no impacts on those species as a result of the Proposed Development.

Peregrine have a core range of 2km (NatureScot, 2016) although with a maximum recorded distance of 18km in Britain. This means most of their foraging will be within 2km of their eyrie, with only occasional flights beyond this. Given the distance between the Proposed Development and the SPA, the use of the Proposed Development by this species would not be enough to create a likely significant effect. The only observations of Peregrine during surveys were outwith the breeding season, and two flights were recorded over two years of surveys.

The sHRA for this site can therefore be concluded with a finding that the Proposed Development can proceed without adverse effect on the integrity of the North Caithness Cliffs SPA and the conservation objectives for this site would be maintained.

2.4 River Thurso SAC

The River Thurso lies 6km west of the Proposed Development and is designated for its population of Atlantic salmon.

There is no hydrological connectivity between the Proposed Development, which drains into the Burn of Durran which enters the Pentland Firth at Castleford. This watercourse does not lie within the catchment of the River Thurso.

As a result there is no pathway for the Proposed Development to affect the SAC and as such, there are no likely significant effects identified of the Proposed Development on the SAC.

The sHRA for this site can therefore be concluded with a finding that the Proposed Development can proceed without adverse effect on the integrity of the River Thurso SAC and the conservation objectives for this site would be maintained.

2.5 Caithness and Sutherland Peatlands SPA

The Caithness and Sutherland Peatlands SPA lies (at its closest point) approximately 8km northeast of the Proposed Development. The SPA is extensive and is designated for 12

breeding species (Table 6-5-1). However, the distribution of those species varies across the SPA and not all species are found in all areas. In addition, the distance between the Proposed Development and the SPA means that even for those species which do occur in the area of the SPA closest to the Proposed Development, the Proposed Development lies too far from the SPA to be considered connected to it for a number of qualifying species. Table 6-5-4 reviews the ranging distances for the qualifying species of the SPA (taken from guidance (NatureScot, 2016)) against the distance between the Proposed Development and the SPA and includers whether the species was observed during surveys.

In the Scoping Report, NatureScot commented that if there was diver activity recorded, then connectivity with this SPA should be considered. This was the only species identified by NatureScot where connectivity could occur.

Table 6-5-4: Review of qualifying features occurrence on or around the Proposed Development Site

Species	Published ranging distance	Recorded during surveys or reason to believe present?	Potentially connected to the SPA?
Black-throated diver	Less than 10 km	No	No due to absence on Proposed Development Site
Golden eagle	Core range of 6 km, maximum range of 10 km	No	No due to absence on Proposed Development Site and lack of suitable habitat within that area of the SPA
Golden plover	Core range of 3 km with maximum range of 11 km	Yes	Possibly; more likely to be non-SPA birds
Hen harrier	Core range of 2 km with maximum range of 10 km	Yes	Possibly; could also be non-SPA birds
Merlin	Within 5 km	No	No due to absence on Proposed Development Site and distance between Site and SPA
Red-throated diver	Generally less than 8 km	No	No due to absence on Proposed Development Site
Short-eared owl	Core range of 2 km with maximum range of 5 km	No	No due to absence on Proposed Development Site and distance between Site and SPA
Wood sandpiper	No information provided	No	No due to absence on Proposed Development Site and distance between Site and SPA
Common scoter	No information provided	One winter record	No. Common scoter are not present in this area of the SPA; the record was observed in January and is considered to be from a wintering bird straying inland
Dunlin	Core range of 500 m with maximum	No	No due to absence on Proposed Development Site and distance between Site and SPA

Species	Published ranging distance	Recorded during surveys or reason to believe present?	Potentially connected to the SPA?
	range of 3 km		
Greenshank	Core range of 2 km with maximum range of 3 km	No	No due to absence on Proposed Development Site and distance between Site and SPA
Wigeon	No information provided	No	No due to absence on Proposed Development Site and distance between Site and SPA

Two species have been identified which were present on the Proposed Development Site which have potential to be connected with the SPA. A third, Common scoter, which is a sea duck which breeds inland in a few locations in the SPA, was observed in January and as such is considered to be a record of a wintering bird straying inland and not an individual which forms part of the SPA population.

Golden plover was recorded on only one occasion, with a flock of 17 birds present on the 21st of April 2020. It is considered this record is more likely to be of migrant birds than the breeding SPA populations. Given that, and the fact that was the only record of the species, no likely significant effect can be identified on the SPA population if the Proposed Development were to go ahead.

Hen harrier was recorded on four occasions during vantage point surveys, but only on one occasion during the breeding season, a female on the 1st of July 2020. Given females have smaller ranging distances than males (Arroyo, 2014) it is not considered this would form part of the SPA population. Given that, and the fact that was the only record of the species during the breeding season, no likely significant effect can be identified on the SPA population if the Proposed Development were to go ahead.

NatureScot were also of the opinion that only if diver activity was recorded would connectivity with this SPA be established. No diver activity was recorded.

The sHRA for this site can therefore be concluded with a finding that the Proposed Development can proceed without adverse effect on the integrity of the Caithness and Sutherland Peatlands SPA and the conservation objectives for this site would be maintained.

2.6 Caithness and Sutherland Peatlands SAC

The Caithness and Sutherland Peatlands SAC lies (at its closest point) approximately 8km north-east of the Proposed Development. The qualifying features of the SAC are detailed in Table 6-5-1 but comprise a number of peatland or wetland habitats as well as otter and marsh saxifrage.

The distance between the Proposed Development and the SAC means there will be no impacts on habitats. There is no hydrological connectivity between the SAC and the Proposed Development. The distance between the two also mean that otters on or around the Proposed Development will not form part of the SAC population.

As a result, there is no pathway for the Proposed Development to affect the SAC and as such, there are no likely significant effects identified of the Proposed Development on the SAC.

The sHRA for this site can therefore be concluded with a finding that the Proposed Development can proceed without adverse effect on the integrity of the Caithness and Sutherland Peatlands SAC and the conservation objectives for this site would be maintained.

2.7 Summary of Screening

Table 6-5-5 shows the summary of the screening for LSE.

Table 6-5-5: Summary of screening for LSE

Site	Appropriate assessment required	For which impacts/features
Caithness Lochs SPA	Yes	Foraging displacement during construction and operation – Greylag goose and Whooper swan Additional mortality due to collision risk - Greylag goose and Whooper swan Barrier effects – Greylag goose and Whooper swan
Loch Watten SAC	No	n/a
North Caithness Cliffs SPA	No	n/a
River Thurso SAC	No	n/a
Caithness and Sutherland Peatlands SPA	No	n/a
Caithness and Sutherland Peatlands SAC	No	n/a

3 Appropriate Assessment

The only Natura site identified as requiring appropriate assessment was Caithness Lochs SPA. Likely significant effects were identified on Whooper swan and Greylag goose of displacement, additional mortality as a result of collision risk and barrier effects. These will be assessed in detail in turn.

3.1 Displacement

Displacement could occur during the construction phase, as a result of the construction activities on the Proposed Development Site and during the operational phase as a result of the presence of infrastructure, particularly the turbines and the battery storage.

Disturbance/displacement during the construction period is likely to be greater than during the operational period due to the higher levels of activity and machinery on the Proposed Development Site during construction. It will however be of a relatively short duration, likely only one winter season. Given the commuting distance of the species involved, the variable use of the area, the limited observed use in the immediate vicinity of the Proposed Development and the short-term nature of the effect this would not rise to a level where there would be a significant disturbance effect on the species, nor would it impact the distribution of the species to the point where the conservation objective could not be maintained. As such, this would not be considered an adverse effect on the integrity of the SPA.

Guidance on displacement of geese around wind farms (NatureScot, 2014) suggests that worst case scenario for goose displacement around turbines is the entire turbine envelop plus 100m buffer. Other distances quoted in a review paper (Rees, 2012) for this species suggest displacement distances of between 200-250m.

Figure 7-1-20 (EIA Report Volume 4) shows the distribution of geese observed during the goose foraging surveys. Fields used on more than one occasion were fields 146, 352 and 353. All had Greylag goose observed on two occasions during the two years of survey. All other fields which recorded geese present were used on only one occasion. This does suggest that either geese forage across a very large number of fields across the winter months or that there are no particularly preferred fields within the survey area and thus in proximity to the Proposed Development.

Table 6-5-6 shows the distance between the Proposed Development and selected fields used by Greylag geese.

Table 6-5-6: Distance between fields used by Greylag geese and the Proposed Development

Field number	Distance to Proposed Development Boundary	Distance to Nearest Turbine
5	80m	580m
9	Partially included within	100m
12	15m	590m
49	15m	1190m
94	850m	1275m
353	910m	1260m
361	1120m	1100m

Usage in close proximity to the Proposed Development was limited, with only one field within 500m of turbines - Field 9 which was used on one occasion by 37 Greylag geese. Field 49 is close to the field which will contain the battery storage. Use of this field by Greylag geese was also recorded on one occasion, when a single Greylag goose was recorded.

As a result, if displacement around the turbines or battery storage was to occur, the effects would be limited to a small area, due to the small turbine envelope, where goose occupancy was very intermittent. As such, there would be no significant disturbance of foraging geese during the operational phase of the Proposed Development and the distribution of Greylag goose would not be affected as a result.

Whooper swan field usage was mainly to the south of the Proposed Development, in the vicinity of Loch Scarmclate (Figure 7-1-21 EIA Report Volume 4). Three fields immediately adjacent to the Proposed Development were each used once across the two years of surveys during surveys by small numbers of swans:

- Field 5 north of the Proposed Development – 7 swans present in February 2021;
- Field 49 west of the Proposed Development – 4 swans present in October 2020; and
- Field 59 south of the Proposed Development – 9 swans present December 2019.

Rees (Rees, 2012) reported that studies showed typical displacement of swans around operational windfarms was up to 600m from the turbines. Table 6-5-7 shows the distance between selected fields used by Whooper swan (selected on the basis of their usage and proximity to the Proposed Development).

Table 6-5-7: Distance between fields used by Whooper swans and the Proposed Development

Field number	Distance to Proposed Development Boundary	Distance to Nearest Turbine
5	80m	580m
49	15m	1190m
59	Adjacent	750m
72	490m	1580m
82	460m	1470m
87	875m	1950m

Of these, only one field lies within 600m of the turbines and that was used on one occasion during surveys, with seven swans present. Fields 49 and 59 may also see some displacement as a result of the battery storage immediately adjacent to those fields, as a result of the battery storage creating a visual barrier to grazing swans which mean they may avoid grazing too close to it due to increased predation risk. However, it is not considered this would lead to complete displacement; birds will likely avoid feeding close to the battery storage as they may avoid other building like structures. It is noted that Field 87, the field with the highest usage, has farm buildings in the southwest corner. In addition, usage of the fields in the vicinity of the proposed battery storage was very occasional.

For all other fields, the distance from the turbines means there would be expected to be no displacement effects on fields used by Whooper swans during the survey period. Although field usage can vary year to year, given the small footprint of the Proposed Development, the displacement effects will be limited across the area and the historical records do not indicate greater use of the area which may be subject to

displacement effects. As such, the distribution of Whooper Swan would not be affected by the Proposed Development.

Cumulative displacement could occur if there were other developments in the vicinity which were also creating displacement. However, because the SPA spreads over a relatively large area the potential foraging area is also relatively large. Patterson (Patterson, Lambie, Smith, & Smith, 2013) in a study over the Caithness Lochs area showed Greylag geese and Whooper Swam foraging over a relatively wide area, which would reduce susceptibility to cumulative displacement. Additionally, current developments are generally in areas where there are few records of feeding geese or swans, meaning cumulative displacement effects will be limited and not at a level where there would be a change to the distribution of birds foraging across the wider area.

As a result, the impact of displacement on the Greylag goose and Whooper Swan SPA populations would not cause an adverse effect on the SPA and the Proposed Development could proceed without affecting the integrity of the SPA.

3.2 Additional mortality

Chapter 7: Ornithology details the collision risk modelling undertaken. Table 6-5-8 shows the outcomes of the modelling.

Table 6-5-8: Collision risk modelling results

Species	Time period	Corrected Annual Risk	No. of years per collision	No. of birds colliding over 30 years
Greylag goose	Year 1	2.041	0.490	61.217
	Year 2	0.701	1.427	21.018
	Mean	1.371	0.730	41.118
Whooper swan	Year 1	0.909	1.100	27.280
	Year 2	0.022	45.638	0.657
	Mean	0.466	2.148	13.968

The mean estimated collision mortality for Greylag goose is 1.371 birds per year or 41 birds across the 30-year lifetime of the Proposed Development.

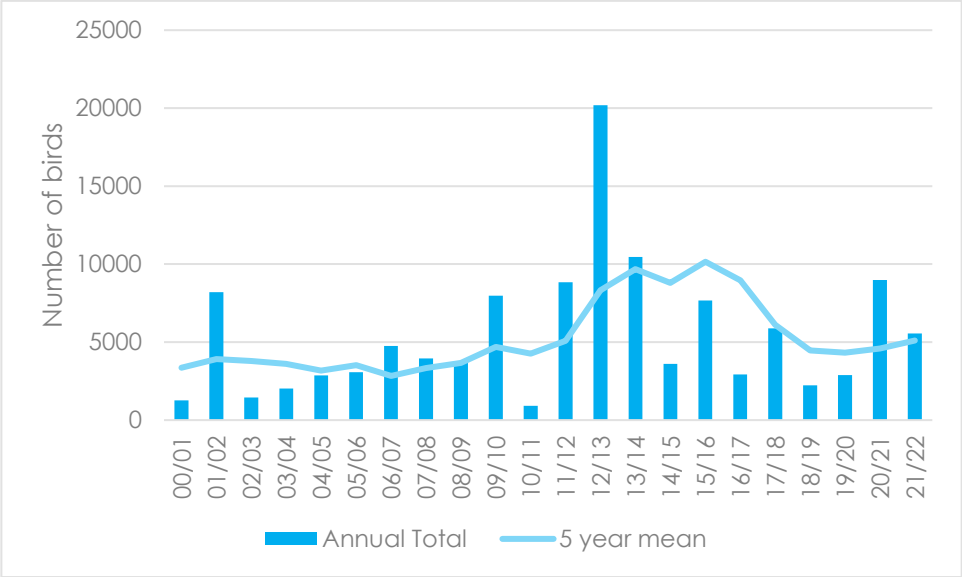
This is set against the SPA citation population of 7,190 birds (based on winters between 1993/94 – 1997/98). Using published WeBS[1] records (Austin, et al., 2023) based on the maximum count observed at the constituent lochs of the SPA, the current five-year mean is approximately 5111 birds (2017/18 – 2021/22). Despite the reduction compared with the citation population, the species is still assessed as being in favourable maintained condition; the population is variable year on year but there has been no evidence for a long-term decline (Plate 6-5-1).

As such, on a population of this size, the estimated collision risk is not at a level where there would be any population effects on the SPA population. The variation in annual

[1] Contains Wetland Bird Survey (WeBS) data from Waterbirds in the UK 2021/22 © copyright and database right 2023. WeBS is a partnership jointly funded by the BTO, RSPB and JNCC, with fieldwork conducted by volunteers and previous support from WWT

natural mortality is likely to be greater than the predicted collision risk due to mortality and as such there would be no effect from the additional mortality due to collision.

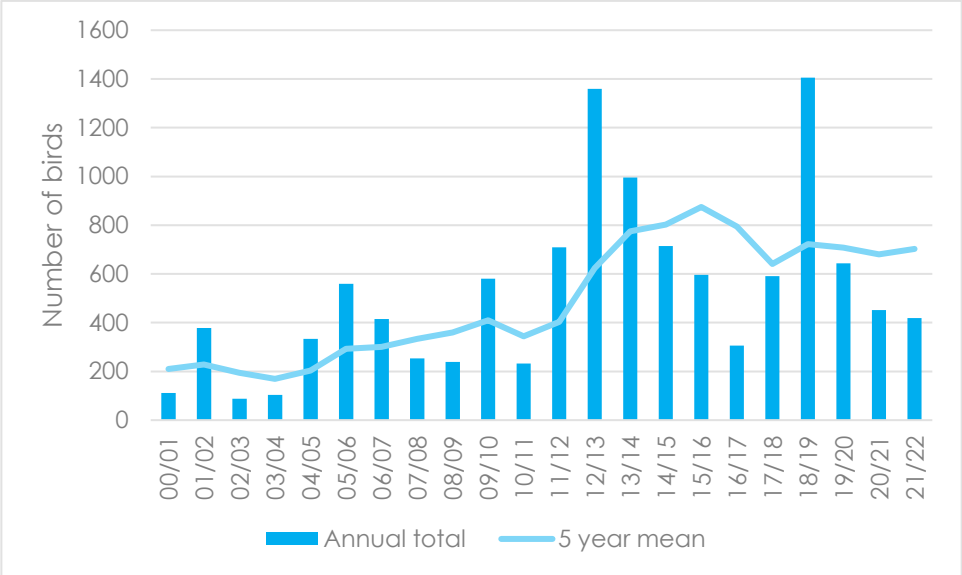
Plate 6-5-1 Annual SPA population of Greylag goose 2000/01 – 2021/22



The population at time of citation for Whooper swan was 240 birds. However, since time of designation, the population has increased (Plate 6-5-2). Using published WeBS[2] records (Austin, et al., 2023) based on the maximum count observed at the constituent lochs of the SPA, the current five-year mean is approximately 702 birds (2017/18 – 2021/22). Assessed both against a population of this size, and one which has also increased over time, the level of predicted collision risk is, at 0.466 birds per year, or one bird every two years will not have an adverse effect on the SPA population.

[2] Contains Wetland Bird Survey (WeBS) data from Waterbirds in the UK 2021/22 © copyright and database right 2023. WeBS is a partnership jointly funded by the BTO, RSPB and JNCC, with fieldwork conducted by volunteers and previous support from WWT.

Plate 6-5-2 Annual SPA population of Whooper swan 2000/01 – 2021/22



3.2.1 Cumulative mortality

Chapter 7: Ornithology details the results of a cumulative assessment for collision risk carried out concerning the collision risk on the SPA population. Table 6-5-9 shows the estimated cumulative collision risk for Greylag goose.

Table 6-5-9: Cumulative collision risk Greylag goose

Planning category	Estimated Annual Collision risk	Total Collision risk over 25 years*
Consented: Operational, In construction and Approved (including the Proposed Development)	18.891	472.275
In planning	1.817	45.425

*Collision risk has been shown over 25 years despite the application being for a 30-year wind farm because many of those wind farms already approved will have been consented for 25 years only.

Including the Proposed Development, the estimated annual collision is approximately 19 birds per year. It is possible this figure may include breeding Greylag goose if this has not been differentiated within the EIAs from which this information has been drawn.

Given the current size of the SPA population, this level of collision risk is still small by comparison to the likely actual mortality, such that it would not be considered to have an adverse effect on the SPA population.

Table 6-5-10 shows the estimated cumulative collision risk for Whooper swan.

Table 6-5-10: Cumulative collision risk Whooper swan

Planning category	Estimated Annual Collision risk	Total Collision risk over 25 years*
Consented: Operational, In construction and Approved (including the Proposed Development)	0.972	23.328
In planning	0.036	0.900

*Collision risk has been shown over 25 years despite the application being for a 30-year wind farm because many of those wind farms already approved will have been consented for 25 years only.

The cumulative collision risk is estimated at around one bird per year. This is on a population which is larger than at the time of designation and has also expanded within the last ten years; as such the current SPA population would not be adversely affected by the mortality due to the cumulative risk. The Proposed Development could proceed without affecting the integrity of the SPA.

3.3 Barrier effects

Barrier effects occur when birds will not fly through airspace because of the presence of structures or infrastructure that, while it may not physically prevent them flying through the airspace, nevertheless, they are unwilling to fly over the structures/infrastructure present and avoid them or divert around them. This can prevent them accessing feeding or roosting areas, or increases energetic requirements due to longer flying times, which, in a worse case can have increased mortality or reduced breeding capacity.

Information on the response of swans and goose to barriers is provided in a review carried out by Rees (Rees, 2012) and in NatureScot guidance (NatureScot, 2014).

Barrier effects can and do occur, but the Proposed Development is outwith the sensitive 1.5km buffer outlined in the guidance referred to above for geese from the nearest SPA designated lochs.

The small scale of the Proposed Development Site will not create such a large barrier that Greylag goose or Whooper swan swans would be prevented from accessing feeding areas or roosting sites.

Additionally, the alignment of the turbines relative to the local roosts presents a somewhat reduced profile for birds exiting northwards (or returning southwards) to Loch Scarmclate, as birds tend to fly parallel to the Proposed Development rather than perpendicular to it. For those birds observed turning to the northeast, with only two turbines, the distance birds would need to alter their path to avoid the Proposed Development would be limited by the small scale of the Proposed Development Site. While migrant geese and swans have been observed avoiding windfarms by some relatively large distances, locally feeding birds have been recorded making much smaller avoidance movements. Given the small spatial spread of the Proposed Development, if barrier effects occur, additional energetic constraints as a result would be limited and not sufficient to cause additional mortality. There would be no displacement as a result of inaccessibility of roosts or feeding sites as a result of barrier effects.

Cumulative barrier effects could occur if there were other developments in the vicinity which were also creating barrier effects. However, this is not the case; there are no

other developments which could interact with the Proposed Development to create a greater barrier effect.

As a result, the impact of barrier effects on the Greylag goose and Whooper Swan SPA populations would not cause an adverse effect on the SPA and the Proposed Development could proceed without affecting the integrity of the SPA.

4 Conclusions

Table 6-5-11 assesses the conservation objectives the SPA for Greylag goose and Whooper swan and the impacts on them from the Proposed Development.

Table 6-5-11: Review of conservation objectives

Conservation objective	Greylag goose	Whooper swan
To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features	There will be no deterioration of the habitats of Greylag goose or significant disturbance to Greylag goose, so site integrity will be maintained.	There will be no deterioration of the habitats of Whooper swan or significant disturbance to Whooper swan, so site integrity will be maintained.
To ensure for the qualifying species that the following are maintained in the long term:		
• Population of the species is a viable component of the site	Collision risk and cumulative collision risk has been assessed and the level of predicted mortality as a result is not high enough at 18.981 per year (for the cumulative total) to compromise the viability of the Greylag goose population. This conservation objective is maintained.	Collision risk and cumulative collision risk has been assessed and the level of predicted mortality as a result is not high enough at 0.972 per year (for the cumulative total) to compromise the viability of the Whooper swan population. This conservation objective is maintained.
• Distribution of the species within the site	There will be no direct effects on roost sites (i.e. the SPA itself) due to the distance between the closest point of the SPA and the Proposed Development. Displacement effects and barrier effects have been examined in detail, but for the Proposed Development and cumulatively and they will not cause a change in the identified distribution of foraging Greylag goose across the wider area. This conservation objective is maintained.	There will be no direct effects on roost sites (i.e. the SPA itself) due to the distance between the closest point of the SPA and the Proposed Development. Displacement effects and barrier effects have been examined in detail, but for the Proposed Development and cumulatively and they will not cause a change in the identified distribution of foraging Whooper swan across the wider area. This conservation objective is maintained.
• Distribution and extent of habitats supporting the species	Due to the small footprint of the Proposed Development and no evidence of use of the Proposed Development, there would be no change in the distribution and extent of habitats supporting Greylag goose. This conservation objective would be	Due to the small footprint of the Proposed Development and no evidence of use of the Proposed Development, there would be no change in the distribution and extent of habitats supporting Whooper swan. This conservation objective would be

Conservation objective	Greylag goose	Whooper swan
	maintained.	maintained.
• Structure, function and supporting processes of habitats supporting the species	There is no evidence that the habitat lost is supporting habitat with no use of the fields containing the permanent infrastructure. The land take associated with the Proposed Development is very small relative to the availability of supporting habitat. As such, this conservation objective would be maintained.	There is no evidence that the habitat lost is supporting habitat with no use of the fields containing the permanent infrastructure. The land take associated with the Proposed Development is very small relative to the availability of supporting habitat. As such, this conservation objective would be maintained.
• No significant disturbance of the species	Displacement effects have been reviewed in detail and given the very low usage of the area where displacement effects could occur by Greylag geese, there would be no significant disturbance of the species. Construction disturbance would not be significant due to the short term nature and the limited usage of the area around the Proposed Development. This conservation objective would be maintained.	Displacement effects have been reviewed in detail and given the very low usage of the area where displacement effects could occur by Whooper swans, there would be no significant disturbance of the species. Construction disturbance would not be significant due to the short term nature and the limited usage of the area around the Proposed Development. This conservation objective would be maintained.

The sHRA for Caithness Lochs can therefore be concluded with a finding that the Proposed Development can proceed without adverse effect on the integrity of the Caithness Lochs SPA and the conservation objectives for this site would be maintained.