

Tangy IV Wind Farm Section 36C Variation

Technical Appendix 6.2: Shadow Habitats Regulations Appraisal Report

Tangy IV Wind Farm S36C Variation

Technical Appendix 6.2: Shadow Habitats Regulations
Appraisal Report for Kintyre Goose Roosts Special
Protection Area (SPA)

794-ENV-ECO-03221
Shadow HRA
FINAL
11 June 2026

SHADOW HRA REPORT

Document status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
DRAFT	Shadow HRA Report	Rio Stirling	Lisette Coiffait	Martin Scott	27/03/2026
DRAFT 2					05/06/2026
FINAL					11/06/2026

Approval for issue

Martin Scott  30/03/2026

© Copyright R P S Group Limited. All rights reserved.

The report has been prepared for the exclusive use and benefit of our client, and for the sole and specific purpose for which it is provided. R P S Group Limited, any of its subsidiaries, or a related entity (collectively 'RPS') does not accept any liability if this report is used for an alternative purpose from which it is intended. The report does not account for any changes relating the subject matter of the report, or any legislative or regulatory changes that have occurred since the report was produced and that may affect the report.

RPS does not accept any responsibility for any documents or information supplied to RPS by others. It is expressly stated that no independent verification of any documents or information supplied by others has been made.

Unless otherwise agreed in writing by RPS no other party may use, make use of, or rely on the contents of this report. RPS does not accept any responsibility or liability for loss whatsoever to any third party caused by, related to, or arising out of any use or reliance on the report.

Prepared by:

Tetra Tech

Lisette Coiffait

Associate Director

The Culzean Building – 5th Floor,
36 Renfield Street,
Glasgow,
G2 1LU

T +44 141 342 1550

E Lisette.Coiffait@tetrattech.com

Prepared for:

SSE Renewables

Andrew Leach

Consent Strategy Manager

One Waterloo Street,
Glasgow,
G2 6AY

T +44 7586 296 917

E andrew.leach@sse.com

Executive Summary

SSE Generation Limited (“the Applicant”) is proposing to apply to vary the Tangy IV Wind Farm proposal (“the Consented Development”) by increasing the tip height of the turbines alongside other changes to infrastructure (“the Proposed Varied Development”). The Site boundary of the Consented Development and the Proposed Varied Development are the same.

This Shadow Habitat Regulations Appraisal (HRA) Report, which is a supporting document to **Chapter 6: Ornithology** within **Volume 2** of this EIA Report, has been prepared by Tetra Tech RPS (TT-RPS) and commissioned by the Applicant to assess the potential impacts of the Proposed Varied Development on the Kintyre Goose Roosts Special Protection Area (SPA).

As discussed in **Chapter 6** within **Volume 2** of this EIA Report, the Kintyre Goose Roosts SPA is the only European site designated for ornithological features with the potential to be adversely affected by the Proposed Varied Development.

This Shadow HRA Report provides information to assist the competent authority in completing a HRA in line with the Habitats Regulations. The Report considers the potential for the Proposed Varied Development to have Likely Significant Effects (LSEs) on the Kintyre Goose Roosts SPA, which is Stage 1 (Screening) of the HRA process, and the extent to which these effects may have an adverse effect on the integrity of qualifying interest features of the SPA, which is Stage 2 (Appropriate Assessment (AA)) of the HRA process.

Stage 1 (Screening) of the HRA concluded there would be LSEs on Greenland white-fronted goose (*Anser albifrons flavirostris*), which is the only qualifying interest feature of the Kintyre Goose Roosts SPA. This is due to the risk of disturbance, collision and barrier effects throughout the lifecycle of the Proposed Varied Development, and disturbance/displacement during the construction and decommissioning phases, both alone and in-combination with surrounding developments.

Stage 2 (AA) of the HRA concluded that there would be no adverse effects on site integrity of the Kintyre Goose Roosts SPA, either from the Proposed Varied Development alone, or in-combination with other proposed and consented developments in the surrounding area.

Contents

Executive Summary	i
1 Introduction	1
1.1 Background	1
1.2 Scope of Report	1
2 Legislative Background	3
2.1 Context	3
2.2 Summary of the HRA Process	3
2.3 Embedded Mitigation	4
3 Screening of Likely Significant Effects	5
3.1 Overview of the Screening Process	5
3.2 Potential Connectivity with European Sites	5
3.3 European Sites Scoped into Screening	5
Ramsar Site Designation	6
3.4 Summary of Existing Baseline Data	8
Proposed Varied Development	8
Consented Development	11
3.5 Potential Impacts from the Proposed Varied Development	12
Scoped Out Impacts	12
Scoped In Impacts	12
3.6 Determination of Likely Significant Effects	13
3.7 Summary of Potential LSEs	16
4 Appropriate Assessment	17
4.1 Overview of the AA Process	17
4.2 The Kintyre Goose Roosts SPA Greenland-white Fronted Goose Population	17
4.3 Effects Resulting from Collision Mortality	19
4.4 Effects Resulting from Barrier Effects to Movement	20
4.5 Effects Resulting from Artificial Light	21
Mitigation	23
4.6 Effects Resulting from Disturbance/Displacement	23
Mitigation	24
4.7 Assessment of Effects on Site Integrity	25
4.8 In-Combination Effects	29
Introduction	29
Other Plans and Projects	29
Assessment of In-combination Effects	31
4.9 Summary of Effects on Site Integrity	35
5 Conclusion	36
6 References	37

Tables

Table 3.1: Summary of Qualifying Features and Conservation Objectives of the Kintyre Goose Roosts SPA	7
Table 3.2: Summary of Greenland White-Fronted Geese Registrations during the 2025/2026 Roost Surveys	9

SHADOW HRA REPORT

Table 3.3: Summary of Greenland White-Fronted Geese Flight Records at Consented Development 2012 to 2017 12

Table 3.4: Assessment of LSEs on Greenland White-Fronted Goose Qualifying Feature of the Kintyre Goose Roosts SPA due to the Proposed Varied Development 14

Table 4.1: Autumn and Spring Greenland White-Fronted Goose Census Counts at Foraging Areas on the Kintyre Peninsula and Gigha Recorded between 2020-21 and 2024-25 by the GWFGS 17

Table 4.2: Appropriate Assessment of the Impacts of the Proposed Varied Development Alone on the Greenland White-Fronted Goose Qualifying Interest Feature of the Kintyre Goose Roosts SPA in View of its Conservation Objectives 26

Table 4.3: Projects Scoped into the Assessment of In-combination Effects on the Greenland White-Fronted Goose Qualifying Interest Feature of the Kintyre Goose Roosts SPA, Listed in Order of Proximity to the Proposed Varied Development 30

1 Introduction

1.1 Background

- 1.1.1 Tangy IV Wind Farm (“the Consented Development”) is located approximately 9 kilometres (km) north-west of Campbeltown on the Kintyre peninsula in Argyll and Bute, Scotland (“the Site”). The Consented Development was granted S36 consent in 2019 for 16 turbines, each with a tip height of 149.9 metres (m), alongside associated infrastructure, including access tracks, hardstands, cabling and grid connection, with a total generating capacity of up to 80 megawatts (MW). The Consented Development was intended to replace Tangy III and repower the original Tangy I and II developments.
- 1.1.2 SSE Generation Limited (“the Applicant”) is applying to vary the Consented Development by increasing the tip height of the turbines and other associated changes to infrastructure (“the Proposed Varied Development”). The Red Line Boundary (RLB) of the Site is the same for both the Consented Development and the Proposed Varied Development. The layouts of the Consented Development and the Proposed Varied Developments are shown respectively in **Figures 1.1** and **1.3** within **Volume 3a** of this EIA Report.
- 1.1.3 The following documents and Figures sets are referred to throughout this Shadow HRA Report and should be reviewed in conjunction with it:
- **Chapter 6: Ornithology** within **Volume 2a** of this EIA Report;
 - **Technical Appendix 6.1: Ornithology Technical Report**, within **Volume 4** of this EIA Report;
 - **Figures 6.1, 6.2, 6.5, 6.17 and 6.18** within **Volume 3a** of this EIA Report;
 - **Chapter 9: Ornithology** of the 2018 EIA Report for the Consented Development (MacArthur Green for SSE, 2018a);
 - **Appendix 9.1: Ornithology** of the 2018 EIA Report for the Consented Development (MacArthur Green for SSE, 2018b); and
 - **Figures 9.1, 9.3, 9.6, and 9.25 to 9.27** within **Volume 3a** of the 2018 EIA Report for the Consented Development (MacArthur Green for SSE, 2018c).
- 1.1.4 This Shadow Habitat Regulations Appraisal (HRA) Report, which is a follow on supporting document to **Chapter 6: Ornithology** within **Volume 2** of this EIA Report, has been prepared by Tetra Tech RPS (TT-RPS) and commissioned by the Applicant to assess the potential impacts of the Proposed Varied Development on the Kintyre Goose Roosts Special Protection Area (SPA). The location of the Proposed Varied Development in relation to the Kintyre Goose Roosts SPA is shown on **Figure 6.18** within **Volume 3a** of this EIA Report.
- 1.1.5 Details of Greenland white-fronted goose, the qualifying interest feature of the SPA, recorded within and around the Site are presented in **Technical Appendix 6.1** within **Volume 4** of this EIA Report, and in **Technical Appendix 9.1** of the 2018 EIA Report for the Consented Development.

1.2 Scope of Report

- 1.2.1 Where a plan or project has the potential, either alone or in combination with other plans or projects, to result in adverse effects on a European site, under the Conservation of Habitats and Species Regulations (2017) (“the Habitats Regulations”), the competent authority must complete an HRA.

- 1.2.2 The Proposed Varied Development is located approximately 380m from the Kintyre Goose Roosts SPA at the closest point (i.e., Tangy Loch). Due to the proximity, the Proposed Varied Development has the potential to result in Likely Significant Effects (LSEs) on the SPA. As discussed in **Chapter 6** within **Volume 2** of this EIA Report, this is the only European site designated for ornithological features with the potential to be adversely affected by the Proposed Varied Development. Greenland white-fronted goose is the only designated feature of the SPA.
- 1.2.3 This Appendix provides information to inform the HRA of the Kintyre Goose Roosts SPA, which would be undertaken by Scottish Ministers as competent authority for the consideration of the Proposed Varied Development.

2 Legislative Background

2.1 Context

- 2.1.1 Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (“the Habitats Directive”), provides legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species through the establishment and conservation of a network of European sites. These are sites hosting rare and vulnerable habitats and species. This network is designed to enable the natural habitat types and the species' habitats concerned to be maintained or, where appropriate, restored at a favourable conservation status in their natural range.
- 2.1.2 European sites comprise Special Areas of Conservation (SACs) designated under the EC Habitats Directive and Special Protection Areas (SPAs) designated under the EC Wild Birds Directive.
- 2.1.3 The procedures that must be followed when considering developments which are likely to have a significant effect on European sites are set out in Article 6 of the Habitats Directive. This process is implemented into domestic law through the Habitats Regulations.
- 2.1.4 Habitats Directive Article 6(3) (as transposed by Regulation 63 of the Habitats Regulations) sets out the decision-making tests for plans and projects likely to have a significant effect on or to adversely affect the integrity of European sites (Annex 1.1). Article 6(3) establishes the requirement for Appropriate Assessment (AA):
- 2.1.5 *“Any plan or project not directly connected with or necessary to the management of the [European] site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subjected to appropriate assessment of its implications for the site in view of the site’s conservation objectives. In light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.”*

2.2 Summary of the HRA Process

- 2.2.1 Having ascertained that a proposed development is not connected with the management of any European site, the HRA process comprises four main stages:
- **Stage 1 – Screening:** the first stage of the HRA process involves considering whether the plan or project will have a “Likely Significant Effect” (LSE) on the European site in question, either alone, or in combination with other plans or projects. If the Screening process concludes that no LSE on the European site will occur, then the project may be authorised. Otherwise, Stage 2 – “Appropriate Assessment” (AA) would be required.
 - **Stage 2 – AA:** where it is determined that an LSE is possible, the competent authority must carry out an AA to assess the implications of the plan or project in respect of the conservation objectives of the European site in question. This should enable the competent authority to determine whether, or not, the plan or project would adversely affect the integrity of the European site. If it can be ascertained beyond reasonable scientific doubt that the plan or project would not adversely affect the integrity of the European site, then it can be authorised. If not, Stages 3 and 4 would apply.

- **Stage 3 – Alternative Solutions:** where it is determined that the plan or project would have an adverse effect on the integrity of a European site (or where there is uncertainty and a precautionary approach is taken), alternative solutions which would deliver the plan or project objective(s) need to be considered. If there are no alternatives that do not affect the integrity of the European site, Stage 4 applies.
- **Stage 4 – Imperative Reasons** of Overriding Public Interest (IROPI): where a plan or project adversely affects the integrity of a European site and there are no alternative solutions, it may only proceed for imperative reasons of overriding public interest, subject to compensatory measures being secured.

2.3 Embedded Mitigation

- 2.3.1 The ruling of The Court of Justice of the European Union (CJEU) in the matter of People Over Wind and Sweetman v Coillte Teoranta (EU Case Law, 2018) effectively determined that the Screening stage of the HRA must be completed in the absence of proposed mitigation.
- 2.3.2 However, it is recognised that the above ruling permits scope within the Screening stage to consider essential elements of a plan or project that are not primarily concerned with avoiding impacts to European sites.
- 2.3.3 Good practice measures would be implemented during construction of the Proposed Varied Development, with all works to be carried out in accordance with measures detailed in a Construction Environmental Management Plan (CEMP), which the Applicant would issue to the appointed Contractor. An outline CEMP is provided as **Technical Appendix 3.10** within **Volume 4** of this EIA Report. The CEMP would include good practice measures to be implemented during construction of the Proposed Varied Development to control adverse environmental impacts, such as contamination/pollution, and to protect watercourses and sensitive habitats. As these measures are general good practice mitigation that is essential for construction works to proceed safely and in accordance with relevant legislation, rather than specific mitigation to protect the Kintyre Goose Roosts SPA, they are considered at the Screening stage.

3 Screening of Likely Significant Effects

3.1 Overview of the Screening Process

- 3.1.1 This Screening exercise (Stage 1 of the HRA process) is designed to identify the types of effects that the Proposed Varied Development may have, either alone or in combination with other plans and projects, on the qualifying interests of the Kintyre Goose Roosts SPA, and assess whether an LSE can be discounted with respect to the qualifying interest features of the SPA.
- 3.1.2 To determine if the Proposed Varied Development is likely to have any significant effects on the Kintyre Goose Roosts SPA, the following issues are considered:
- Whether the Proposed Varied Development could affect the qualifying interest features, and how sensitive / vulnerable they are likely to be to the effect;
 - The probability of the effect occurring;
 - The likely consequences for the SPA's conservation objectives if the effect occurred; and
 - The magnitude, duration and reversibility of the effect.

3.2 Potential Connectivity with European Sites

- 3.2.1 The potential impacts of a proposed plan or project may extend beyond its boundaries. There is no specified maximum distance from a European site boundary beyond which potential impacts from the proposed plan or project can be dismissed as having no effect. If there are processes or pathways by which a proposal may influence the qualifying interests of a European site, the proposed plan or project must be considered, regardless of how distant it is from the site.
- 3.2.2 Consideration should, therefore, be given to the potential for connectivity between the proposal and each of the qualifying interests of the European site, i.e., whether there are processes or pathways by which the proposal may influence the European site's interests directly or indirectly. For example, if a proposed development is located within the catchment of an SAC designated for aquatic features, or within the foraging range of an SPA bird species, there is potential connectivity between the development and the European site.

3.3 European Sites Scoped into Screening

- 3.3.1 It was considered that the proposed works could potentially have adverse effects on European sites within the following areas:
- Any European sites overlapping the footprint of the Proposed Varied Development;
 - Any European sites with adjoining 'functionally linked habitat' with the footprint of the Proposed Varied Development, including those within the same river catchment; and
 - Any European sites with qualifying mobile species whose range (e.g., foraging, migratory, overwintering, breeding or natural habitat range) may overlap with the footprint of the Proposed Varied Development.
- 3.3.2 As discussed in **Chapter 6** within **Volume 2** of this EIA Report, the Kintyre Goose Roosts SPA is considered to be the only European site designated for ornithological features with the potential to be adversely affected by the Proposed Varied Development. A summary of the qualifying feature and conservation objectives of the Kintyre Goose Roosts SPA is

presented overleaf in Table 3.1 and the location is shown in **Figure 6.18**, within **Volume 3a** of this EIA Report.

Ramsar Site Designation

- 3.3.3 Note that the National Planning Framework 4 (NPF4) (Scottish Government, 2023) states that all Ramsar sites are also European sites and/or Sites of Special Scientific Interest (SSSIs) and are extended protection under the relevant statutory regimes. Scottish Government policy on protecting Ramsar sites states that, where Ramsar interests coincide with European site qualifying interests protected under an SPA or an SAC, the interests are given the same level of (legal) protection as the European sites, while Ramsar interests that are not the same as European site qualifying interests but instead match SSSI features, these receive protection under the SSSI regime.
- 3.3.4 The Kintyre Goose Roosts SPA is also a Ramsar site. However, the boundary of the Ramsar site is coincident with that of the SPA and it is designated under Ramsar Criterion 6 for the same bird population feature as the SPA (NatureScot, formerly Scottish Natural Heritage (SNH), 2025a; SNH 1998). Therefore, a separate assessment of LSEs on the Ramsar site is not considered necessary as the outcome of the assessment on relevant qualifying interest features will be the same as for the Kintyre Goose Roosts SPA.

Table 3.1: Summary of Qualifying Features and Conservation Objectives of the Kintyre Goose Roosts SPA

SPA Description and Qualifying Features	Summary of SPA Conservation Objectives
The Kintyre Goose Roosts SPA comprises a series of hill lochs (Loch Garasdale, Loch an Fhraoich, Lussa Loch, Tangy Loch & Black Loch) and an area of grassland and heath at Rhunahaorine Point on the Kintyre peninsula in south-west Scotland. The boundaries of the SPA are within those of Rhunahaorine Point SSSI and Tangy Loch SSSI and are coincident with those of Kintyre Goose Lochs SSSI. Kintyre Goose Roosts SPA qualifies under Article 4.1 of the EC 'Birds' Directive by regularly supporting an internationally important wintering population of Greenland white-fronted goose (1991/92-95/96 winter peak mean of 2,300 birds, 8% of the total world population and 16% of the population of Great Britain). The geese roost on the various lochs included in the SPA and on the grassland and heath at Rhunahaorine Point. These roosts all held internationally or nationally important numbers during the mid-1990s. The geese use several other roosts on Kintyre, but their use is more sporadic and the geese are not present in nationally important numbers. There are two main populations, one which feeds on improved agricultural land around Rhunahaorine Point with significant roosts on Rhunahaorine Point, Loch an Fhraoich and Loch Garasdale; and another which feeds on improved agricultural land in the Laggan area with significant roosts on Lussa Loch, Tangy Loch and Black Loch.	• To avoid deterioration of the habitats of the qualifying species (listed below) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and • To ensure for the qualifying species that the following are maintained in the long term: – Population of the species as a viable component of the site. – Distribution of the species within site. – Distribution and extent of habitats supporting the species. – Structure, function and supporting processes of habitats supporting the species. – No significant disturbance of the species.
Source: SNH (1998).	Source: NatureScot (n.d.).

3.4 Summary of Existing Baseline Data

- 3.4.1 As any Greenland white-fronted goose results from the baseline surveys for the Proposed Varied Development and the Consented Development are of particular relevance to this HRA, a high-level summary of the results is included below for reference.

Proposed Varied Development

- 3.4.2 Targeted ornithology surveys for the Proposed Varied Development were completed between April 2025 and May 2026, which included a full year of vantage point (VP) surveys throughout this period, with regular dawn/dusk surveys to record any roosting Greenland white-fronted geese. Additionally, targeted roosting goose surveys were completed between October 2025 and May 2026. Full details of all survey and desk study methods and results are detailed in **Technical Appendix 6.1** within **Volume 4** of this EIA Report.
- 3.4.3 The VP surveys covered the Site and a surrounding 500m buffer area, with the aim of recording flight activity of target species, which included Greenland white-fronted geese, to inform Collision Risk Modelling (CRM). Surveys followed standard NatureScot (2025b) guidance. During the VP surveys, Greenland white-fronted geese were recorded in flight on three separate days in October 2025. The flights are presented in **Figure 6.5 6.5** within **Volume 3a** of this EIA Report. A total of 12 flights were recorded, with flock size ranging from 2 – 175 birds, averaging 43 birds per flight. Nine of the flights involved birds landing on or taking off from Tangy Loch, typically coming from or heading south.
- 3.4.4 The roosting goose surveys focussed on Tangy Loch (which is the only SPA loch within potential disturbance distance of the Proposed Varied Development) with the aim of recording use of this loch by Greenland white-fronted geese. One dawn and one dusk survey were completed per month between October and April, with a single survey visit completed in early May (15 survey visits in total). In line with NatureScot (2025b) guidance, surveys were based on the method described in Gilbert *et al.* (1998) and involved watches of up to three hours from a VP overlooking Tangy Loch to count any Greenland white-fronted geese present/arriving at or leaving the loch. The goose roost VP location is shown in **Figure 6.2** within **Volume 3a** of this EIA Report.
- 3.4.5 Greenland white-fronted geese were regularly recorded at Tangy Loch; a peak count of 1,315 birds were recorded roosting on 23rd March 2026. Additionally, 1,556 and 1,487 Greenland white-fronted geese were recorded landing on Tangy Loch during dusk surveys on 21st December 2025 and 24th February 2026, respectively; however, the majority of these skeins were later seen departing and heading towards Lussa Loch. Registrations are summarised in Table 3.2 and shown in **Figure 6.17** within **Volume 3a** of this EIA Report.

Table 3.2: Summary of Greenland White-Fronted Geese Registrations during the 2025/2026 Roost Surveys

Visit No.	Dawn/Dusk Survey	Survey Date	Survey Start Time	Survey End Time	Total Count of Birds on Tangy Loch	Evidence of Roosting on Tangy Loch?	Summary of Registrations
1	Dawn	17/10/2025	06:28	07:28	191	Yes	Approximately 191 Greenland white-fronted geese were roosting on Tangy Loch at the start of the survey and departed at 06:33 and flew south-west; the count was an estimate due to lack of light.
2	Dusk	27/10/2025	15:33	17:33	288	Yes	A flock of 87 Greenland white-fronted geese flew in from the south-west at 16:30 and circled Tangy Loch for a period before landing. These birds were joined by three additional flocks (numbering 170, 19 and 12 birds) which flew onto the loch from the south between 16:39 and 17:09.
3	Dawn	12/11/2025	06:20	08:40	0	No	No Greenland white-fronted geese observed.
4	Dusk	25/11/2025	15:00	17:45	c.630	Possible	Several skeins of Greenland white-fronted geese were observed flying over Tangy Loch; approximately five skeins totalling an estimated 630 birds landed on the loch though most, possibly all, departed after dark, flying north-east in the direction of Lussa Loch.
5	Dawn	11/12/2025	07:15	09:45	201 (minimum count)	Yes	Several hundred Greenland white-fronted geese were present on Tangy Loch at the start of the survey, whilst still dark, but precise numbers could not be determined due to lack of light. Birds departed between 07:29 and 08:14, with the majority of birds flying south-southeast. A skein of 200 birds was also observed to the east of Tangy Loch, flying south from the direction of Lussa Loch, indicating that additional birds may have roosted there.
6	Dusk	21/12/2025	14:45	17:30	c.1,556	Yes	Seven skeins of Greenland white-fronted geese totalling an estimated 1,556 birds landed on Tangy Loch between 16:31 and 16:57, with an additional skein of 200 birds seen flying in the direction of Lussa Loch during this period. Approximately 1,200 birds departed the loch at 17:01, flying east-northeast in the direction of Lussa Loch, with 200-300 birds still present on the loch when the survey ended (due to lack of light).
7	Dawn	09/01/2026	07:10	09:20	0	No	No Greenland white-fronted geese were observed on Tangy Loch. Four skeins of 2,000, 500, 56 and 400 birds (the larger two mixed with greylag geese (<i>Anser anser</i>)) were recorded flying from the direction of Lussa Loch, one of which (the smallest) flew south-west over Tangy Loch, with the remaining three to the east of Tangy Loch, flying south-southwest.
8	Dusk	20/01/2026	15:30	17:45	0	No	No Greenland white-fronted geese were observed on Tangy Loch. A flock of birds was heard (but not seen) to the east of Tangy Loch flying north towards Lussa Loch and a skein of at least 100 birds was observed flying north-east over Tangy Loch towards Lussa Loch.
9	Dawn	11/02/2026	06:30	08:45	250	Yes	Up to 250 birds were roosting on Tangy Loch at the start of the survey and departed at 07:03, flying east. A skein of 150 birds was also observed flying west-southwest over Tangy Loch at 07:16.

Shadow HRA Report

Visit No.	Dawn/Dusk Survey	Survey Date	Survey Start Time	Survey End Time	Total Count of Birds on Tangy Loch	Evidence of Roosting on Tangy Loch?	Summary of Registrations
10	Dusk	24/02/2026	16:40	19:15	1,487	No	Five skeins of Greenland white-fronted geese, totalling approximately 1,487 birds, landed on Tangy Loch between 17:57 and 18:15, but all birds departed at 18:19, flying east then north-east towards Lussa Loch. Two skeins numbering 300 and eight birds were also observed flying over (but not landing on) Tangy Loch at 17:50 and 18:25 respectively, flying north-east towards Lussa Loch.
11	Dawn	11/03/2026	05:15	08:20	0	No	Greenland white-fronted geese were heard calling to the east-northeast of Tangy Loch but were not seen. The calls were distant, but the birds appeared to be moving south.
12	Dusk	23/03/2026	17:10	19:45	1,315	Yes	Forty-three Greenland white-fronted geese were present on Tangy Loch at the start of the survey. Ten skeins totalling 1,272 birds flew in, mostly from the south (two from the north) and landed on the loch between 18:02 and 18:41 to join those already present. Birds tended to congregate at the western end of the loch upon landing before spreading out, mostly drifting towards the eastern end of the loch. All birds were still present at end of the survey. An additional flock of 12 Greenland white-fronted geese was observed to the south-east of Tangy Loch at 18:54, flying north-east towards Lussa Loch.
13	Dawn	09/04/2026	05:00	08:30	6	Yes	Six Greenland white-fronted geese were roosting at the western shore of Tangy Loch at the start of the survey. These departed at 07:16, flying south-west then south.
14	Dusk	21/04/2026	19:20	22:20	0	No	No Greenland white-fronted geese observed.
15	Dawn	08/05/2026	05:00	07:00	0	No	No Greenland white-fronted geese observed.

Consented Development

- 3.4.6 Full details of survey methods and results are presented in **Appendix 9.1: Ornithology** of the 2018 EIA Report for the Consented Development (MacArthur Green for SSE, 2018). A brief summary of registrations (based on the information presented in **Chapter 9** and **Appendix 9.1** of the 2018 EIA Report for the Consented Development) is presented below for reference.
- 3.4.7 Targeted ornithology surveys for the Consented Development were completed between April 2012 and March 2014 as well as between October 2016 and November 2017.
- 3.4.8 Surveys included VP surveys conducted from the same three VP locations used for the Proposed Varied Development during four non-breeding seasons: 2012/2013, 2013/2014, 2016/2017 (when survey effort per VP was 38-48 hours per VP¹) and September to November 2017 (when survey effort was 24 hours per VP).
- 3.4.9 Winter goose roost surveys, comprising VP watches and perimeter searches of Tangy Loch, were also conducted over two non-breeding seasons: September 2012 to February 2013 and October 2013 to February 2014.
- A total of 75 confirmed Greenland white-fronted goose flights and a further 57 potential flights² were recorded during the VP surveys completed between 2012 and 2017 (**Figure 9.6** of the 2018 EIA Report for the Consented Development).
 - During the 2012/2013 roost surveys, 12 Greenland white-fronted goose flights were recorded (**Figure 9.25** of the 2018 EIA Report for the Consented Development), of which 10 were “grey geese”² or in mixed flocks with greylag geese (*Anser anser*).
 - During the 2013/2014 roost surveys, 21 Greenland white-fronted geese flights were recorded (**Figure 9.25** of the 2018 EIA Report for the Consented Development), of which 21 were grey geese² or in mixed flocks with greylag geese.
 - There was also a total of nine incidental Greenland white-fronted goose flights during the 2012-13 and 2013-14 non-breeding season, some of which were in mixed flocks with greylag geese.
- 3.4.10 Table 3.3 presents a summary of all Greenland white-fronted goose flight records at the Consented Development during baseline surveys.
- 3.4.11 There were also five incidental records of Greenland white-fronted geese roosting or loafing on Tangy Loch: 150 birds on 26 November 2012, 480 birds on 4 November 2013, 12 birds on 26 October 2016, one on 17 April 2017, and 24 birds on 9 October 2017. Note that these records are in addition to the flights summarised above, some of which involved birds flying onto or departing from one of the SPA lochs (i.e. Tangy Loch and Lussa Loch).
- 3.4.12 Many flights of Greenland white-fronted geese were of birds flying towards Tangy Loch and Lussa Loch from the south, or similarly, leaving the lochs in a south/south-westerly direction (**Figure 9.26** in the 2018 EIA Report for the Consented Development), likely heading towards foraging grounds in the Laggan area.
- 3.4.13 Nine of the 132 Greenland white-fronted goose flights recorded during VP surveys were taken forward for CRM which estimated a worst-case scenario mortality rate of 0.0382 in the non-breeding season per year, which corresponds to 1.9 birds during the operational period of the Proposed Varied Development (50 years).

¹ 36 hours per VP per season is the minimum recommendation for VP survey effort in NatureScot (2025b) guidance.

² Recorded as “grey goose” (i.e., it was not possible to identify the species).

Table 3.3: Summary of Greenland White-Fronted Geese Flight Records at Consented Development 2012 to 2017

Season	No. Flights				Average Flock Size	Flock Size Range
	VP Surveys	Goose Roost Surveys	Incidental Flights	Total		
2012/2013 Recorded between September 2012 and mid-May 2013	53	12	2	67	146	7 – 1,000
2013/2014 Recorded between September 2013 and March 2014	8	21	7	36	77	6 – 230
2016/2017 Recorded between October 2016 and mid-May 2017	68	-	0	68	126	3 – 810
September to November 2017	3	-	0	3	15	1 – 24

Source: Table 9.9 in Chapter 9: Ornithology of the EIA Report for the Consented Development (MacArthur Green for SSE, 2018)

3.5 Potential Impacts from the Proposed Varied Development

Scoped Out Impacts

- 3.5.1 As the Proposed Varied Development is located approximately 380m from the Kintyre Goose Roosts SPA (i.e., Tangy Loch) at the closest point, there is not considered to be any potential for direct impacts on qualifying features due to loss or fragmentation of supporting habitats within the SPA.
- 3.5.2 While the Site is within the core foraging range (5-8km; SNH, 2016) of Greenland white-fronted goose roosting at the following SPA lochs: Tangy Loch, Lussa Loch or Black Loch (SNH, 1998), an indirect loss of foraging habitat due to disturbance/displacement is not expected to occur as the Site and immediate peatland and forestry surroundings does not contain suitable foraging habitat for geese (e.g., grassland and stubble fields).
- 3.5.3 Compared with construction and decommissioning works, routine operational maintenance of the Proposed Varied Development is expected to be limited both spatially and temporally, and there is not considered to be any potential for this to result in an LSE on the qualifying interest feature of the Kintyre Goose Roosts SPA.
- 3.5.4 The presence of operational turbines could, theoretically, deter birds from using a traditional roost site, however Greenland white-fronted geese have continued to roost on Tangy Loch throughout the near two-decade presence of the existing operational Tangy Wind Farm turbines, which the Proposed Varied Development would replace. Additionally, the 2019 AA completed for the Consented Development by Scottish Ministers notes that Tangy Loch... *“was irregularly used before the existing wind farm was built and the irregular use has continued so it is unlikely the existing wind farm is causing any displacement.”*
- 3.5.5 As such there is not considered to be any potential for an LSE due to displacement of roosting birds from Tangy Loch due to the presence of the Proposed Varied Development.

Scoped In Impacts

- 3.5.6 Since the recommended disturbance distance for non-breeding Greenland white-fronted geese is 200-600m (NatureScot, 2022), and the Proposed Varied Development lies within this range from Tangy Loch (380m), there is potential for disturbance of roosting birds within the SPA itself.

- 3.5.7 Direct collision impacts and/or barrier effects may occur where the regular flight paths of geese cross the Site as they travel between roosts and foraging grounds, or if they cross the Site during migratory flights.
- 3.5.8 Potential impacts of the Proposed Varied Development on the qualifying interest feature of the Kintyre Goose Roosts SPA are therefore considered to be:
- Indirect impacts on the condition of habitats supporting the SPA species due to accidental contamination/pollution of groundwater and/or watercourses during the construction or decommissioning phases;
 - Mortality of the SPA species due to collision with turbines during daily foraging/roosting commutes or migratory flights during the operational phase;
 - Barrier effects resulting in an alteration of typical flight paths of the SPA species throughout the operational phase;
 - Attraction or displacement of the SPA species during flight or visual disturbance of roosting SPA birds due to artificial lighting (on the turbines) during the operational phase; and
 - Noise and visual disturbance and/or displacement of roosting SPA birds during the construction or decommissioning phases.

3.6 Determination of Likely Significant Effects

- 3.6.1 An assessment of whether there will be an LSE on the qualifying interest feature, namely Greenland white-fronted goose, of the Kintyre Goose Roosts SPA is presented overleaf in Table 3.4.

Table 3.4: Assessment of LSEs on Greenland White-Fronted Goose Qualifying Feature of the Kintyre Goose Roosts SPA due to the Proposed Varied Development

Relevant Impacts	Phase		Consideration of LSE	Conclusion Regarding LSE
	C/D	O		
Indirect impacts on the condition of habitats supporting the SPA species due to accidental contamination/pollution of groundwater and/or watercourses	✓	×	The Site does not overlap with the SPA, but there is potential hydrological connectivity. A major accidental groundwater contamination/watercourse pollution event during construction or decommissioning of the Proposed Varied Development could potentially result in an LSE on habitats within the SPA that support the qualifying feature. However, good practice measures to avoid groundwater contamination/watercourse pollution will be implemented during construction works, as outlined in the CEMP. It is anticipated that similar measures will be implemented during decommissioning. As such, there is not considered to be any potential for indirect effects on the SPA arising from the construction or decommissioning phases of the Proposed Varied Development, either alone or in combination with surrounding developments.	No LSE
Mortality of the SPA species due to collision with turbines during daily foraging/roosting commutes or migratory flights	×	✓	Geese are vulnerable to turbine collisions because they often fly in large flocks and along predictable low-altitude commuting routes between feeding and roosting sites. Collisions are more likely to occur where turbines overlap known flyways, wetlands, or open fields that attract geese. The Proposed Varied Development is located approximately 380m from Tangy Loch (at the closest point) so Greenland white-fronted geese commuting between this roost site and foraging areas could travel through or over the Site. Birds could also be at risk when arriving at or departing from the SPA during migratory periods. Therefore, there is potential for an LSE on the SPA Greenland white-fronted goose population due to mortality from collision with turbines during the operational phase of the Proposed Varied Development, either alone or in combination with surrounding developments.	LSE
Barrier effects resulting in an alteration of typical flight paths of the SPA species	×	✓	Barrier effects could arise for Greenland white-fronted geese which roost at the SPA, predominately Tangy Loch or Lussa Loch if birds are deterred from their usual flight routes between roosts and their feeding areas by a physical or perceived barrier to movement. Turbines could potentially create such barriers, displacing birds from preferred airspace and increasing energetic costs as they fly around or over the Site. Given the proximity of the Site and the SPA there is potential for an LSE on the SPA Greenland white-fronted goose population due to barrier effects during the operational phase of the Proposed Varied Development, either alone or in combination with surrounding developments.	LSE
Attraction or displacement of the SPA species during flight or visual disturbance of roosting SPA birds due to artificial lighting (on the turbines)	×	✓	Artificial lighting associated with the turbines could give rise to potential effects on Greenland white-fronted geese through both attraction and avoidance responses. Birds in flight may be drawn towards illuminated infrastructure, particularly under poor visibility conditions, increasing the likelihood of collision with turbine components or associated structures. Alternatively, geese may exhibit avoidance behaviour in response to lighting, which could result in displacement from favoured flight corridors, roost sites or foraging areas. While such avoidance may reduce collision risk, it could nonetheless create functional loss of habitat or increased energetic costs through altered movement patterns. In addition, if lighting is visible from Tangy Loch, there is potential for disturbance to birds using this SPA roost site, particularly where lighting is directed towards the loch or creates a visible glow across the wider roost landscape. Disturbance at this location could lead to reduced roost use, increased vigilance, or displacement to less suitable sites, with potential implications for the integrity of the SPA. Given the proximity of the Site and the SPA there is potential for an LSE on the SPA Greenland white-fronted goose population due to attraction or displacement during flight or visual disturbance of roosting	LSE

Shadow HRA Report

Relevant Impacts	Phase		Consideration of LSE	Conclusion Regarding LSE
	C/D	O		
			birds due to artificial lighting during the operational phase of the Proposed Varied Development, either alone or in combination with surrounding developments.	
Noise and visual disturbance and/or displacement of roosting SPA birds	✓	✗	As summarised in section 3.4, Greenland white-fronted geese were regularly recorded on Tangy Loch (part of the SPA), although they did not always roost there, with survey results indicating that Lussa Loch was the preferred roost site. The recommended disturbance buffer for this species is 200-600m (NatureScot, 2022). Therefore, there is potential for an LSE on the Greenland white-fronted goose SPA population due to disturbance/ displacement of roosting birds during construction or decommissioning phases of the Proposed Varied Development, either alone or in combination with surrounding developments.	LSE

3.7 Summary of Potential LSEs

- 3.7.1 It is considered that the Proposed Varied Development could result in LSEs on the Greenland white-fronted goose qualifying interest feature of the Kintyre Goose Roosts SPA due to the following impacts:
- Mortality due to collision with turbines during daily foraging/roosting commutes and/or migratory flights during the operational phase;
 - Barrier effects resulting in an alteration of typical flight paths during the operational phase;
 - Attraction or displacement of the SPA species during flight or visual disturbance of roosting Greenland white-fronted geese due to artificial lighting (on the turbines) during the operational phase; and
 - Noise and visual disturbance and/or displacement of roosting birds during the construction or decommissioning phases.

4 Appropriate Assessment

4.1 Overview of the AA Process

- 4.1.1 The AA (Stage 2 of the HRA process) assesses the effects of the Proposed Varied Development on the relevant qualifying interest feature of the Kintyre Goose Roosts SPA in relation to the conservation objectives for the site. The aim of the AA is to determine whether it can be concluded, beyond reasonable scientific doubt, that there would be no adverse effect on the integrity of the SPA caused by the Proposed Varied Development.

4.2 The Kintyre Goose Roosts SPA Greenland-white Fronted Goose Population

- 4.2.1 The Greenland white-fronted goose (*Anser albifrons flavirostris*) is a genetically and morphologically distinct subspecies of the greater white-fronted goose (*Anser albifrons*), being generally larger and darker in plumage with orange bear part colouration. There are five subspecies of greater white-fronted goose, though the Greenland subspecies is a discrete population breeding in western Greenland and wintering in Britain and Ireland.
- 4.2.2 The global population of Greenland white-fronted geese has been steadily decreasing since the 1990s, with 2025 producing the lowest spring count since monitoring began in 1982/1983 (Fox *et al.*, 2025). The 2025 count of 13,303 birds represents a decline of 11.6% from the previous year and a 65% decrease since the peak count of 35,573 birds in 1999 (Fox *et al.*, 2025). The population's greatest threat is low reproductive success caused by unfavourable climate-driven conditions in the breeding areas. A study by Schindler *et al.* (2024) found wintering flocks in the north-eastern sector of the wintering range (which includes Scotland) declined by ~3% per year on average, while those in the south-west (including Irish wintering grounds) fell by roughly 14% per year, reflecting the pattern of most site desertions and severe declines occurring in south-western Ireland. The authors of the study concluded that these regional differences likely stem from variation in breeding and wintering conditions; south-western birds (which breed further north in Greenland) have been hit harder by harsh breeding-season weather (e.g., low temperatures and heavy snow) and by poorer-quality wintering habitats such as low-quality grasslands and croplands, whereas Scottish flocks, which breed farther south in west Greenland, generally fared better despite overall population decreases.
- 4.2.3 At the time of designation, the Kintyre Goose Roosts SPA supported an internationally important wintering population of Greenland white-fronted goose (1991/92-95/96 winter peak mean of 2,300 birds, which represented 8% of the world population and 16% of the population in Great Britain; SNH, 1998). The latest assessed condition of the SPA population was “*Favourable maintained*” in 2014 (NatureScot, 2025c). The Greenland White-Fronted Goose Study (GWFGS) monitors the population across Britain and Ireland. Autumn and spring Greenland white-fronted goose census counts recorded at foraging areas on the Kintyre peninsula and Gigha by the GWFGS over the last five years (Fox *et al.*, 2025; 2024; 2023, 2022, 2021) are provided in Table 4.1.

Table 4.1: Autumn and Spring Greenland White-Fronted Goose Census Counts at Foraging Areas on the Kintyre Peninsula and Gigha Recorded between 2020-21 and 2024-25 by the GWFGS

Foraging Site	2020-21		2021-22		2022-23		2023-24		2024-25	
	Autumn	Spring	Autumn	Spring	Autumn	Spring	Autumn	Spring	Autumn	Spring
Rhunahaorine	458	332	510	386	254	324	253	239	395	322
Machrihanish	1,050	1,607	1,647	1,182	1,629	1,763	1,274	1,776	1,686	1,302
Clachan	119	118	90	84	0	100	82	80	0	132

Foraging Site	2020-21		2021-22		2022-23		2023-24		2024-25	
	Autumn	Spring	Autumn	Spring	Autumn	Spring	Autumn	Spring	Autumn	Spring
Gigha	134	66	100	27	40	51	10	65	47	18
Glenbarr	-	0	63	38	30	17	0	0	12	0

- 4.2.4 The SPA goose population can be split into two subpopulations: one which forages around Rhunahaorine Point, Glenbarr and Gigha, and roosts nearby or at Loch an Fhraoich and Loch Garasdale; and the other population which forages at Laggan (i.e., Machrihanish) and roosts at Lussa Loch, Black Loch and Tangy Loch (GWFGS, n.d. a; SNH, 2011). Additionally, Greenland white-fronted goose also migrate over the Kintyre peninsula, with some birds spending short periods here before continuing their migration.
- 4.2.5 The GWFGS (n.d. b) reports Tangy Loch as being the main roost site for the geese which forage at Machrihanish, noting that *“In former times before protection, sporadic hunting at this site displaced the geese to neighbouring Lussa Loch which may still offer an alternative site”*. Annual winter count data suggest a significant portion of the SPA population forage at Machrihanish – frequently over 1,500 birds between 1996 and 2020 which represents 65% of the SPA population (see Plate 1 below; GWFGS, n.d. b). The number of birds foraging around Machrihanish appears stable; for the years not featured in Plate 1, the spring census counts were (Fox *et al.*, 2024; 2023, 2022, 2021):
- 2023/2024 – 1,776;
 - 2022/2023 – 1,763,
 - 2021/2022 – 1,182 (though the autumn peak count was 1,647); and
 - 2020/2021 – 1,607.
- 4.2.6 These data suggest that a significant proportion of the SPA population of Greenland white-fronted geese may roost at Tangy Loch. This was not reflected in the surveys conducted in 2012 – 2017 for the Consented Development since geese were recorded infrequently at Tangy Loch and in numbers below 500 (peak count of 480 birds in November 2013). However, the majority of flights recorded at the Site were either coming in from or heading to the south, likely travelling to/from the Machrihanish foraging area, highlighting that the geese likely roost at either Tangy Loch or Lussa Loch (SNH, 2011). Data from the 2025/2026 roost surveys for the Proposed Varied Development suggest more frequent use of Tangy Loch, with a peak count of 1,315 birds in March 2026. Larger numbers were recorded on Tangy Loch at dusk; however, these skeins were seen leaving and heading towards Lussa Loch before the end of the surveys, suggesting Lussa Loch may be the more important roost site.
- 4.2.7 Tangy Loch itself is also a Site of Special Scientific Interest (SSSI) designated for the Greenland white-fronted geese population. The site’s management statement reports the feature condition to be *“in unfavourable condition, with no change,”* based on 66 dawn/dusk surveys conducted between November 2001 and January 2004 (SNH, n.d.), during which time, the geese were recorded on or near the SSSI on only three occasions, in numbers of 17 to 30 birds (SNH, n.d.) The document states:
- 4.2.8 *“These results suggest that Greenland white-fronted geese do not, at present, use Tangy Loch as a regular roost site. For reasons not clearly understood, it appears that the geese now use the nearby Lussa Loch as their preferred roost site, with Tangy Loch as an infrequently used satellite roost. No on-site factors can currently be linked to the decrease in goose usage of Tangy Loch. There is no evidence that the recently constructed Tangy wind farm as [sic] associated power lines have affected goose usage of Tangy Loch.”*
- 4.2.9 However, it should be noted that this statement is based on data which are over 20 years old. More recent data collected for the Proposed Varied Development and Consented Development show regular use of Tangy Loch as a roost (or pre-roost) site, and

occasionally in high numbers (peak count of 1,556 birds in December 2025; see section 3.4).

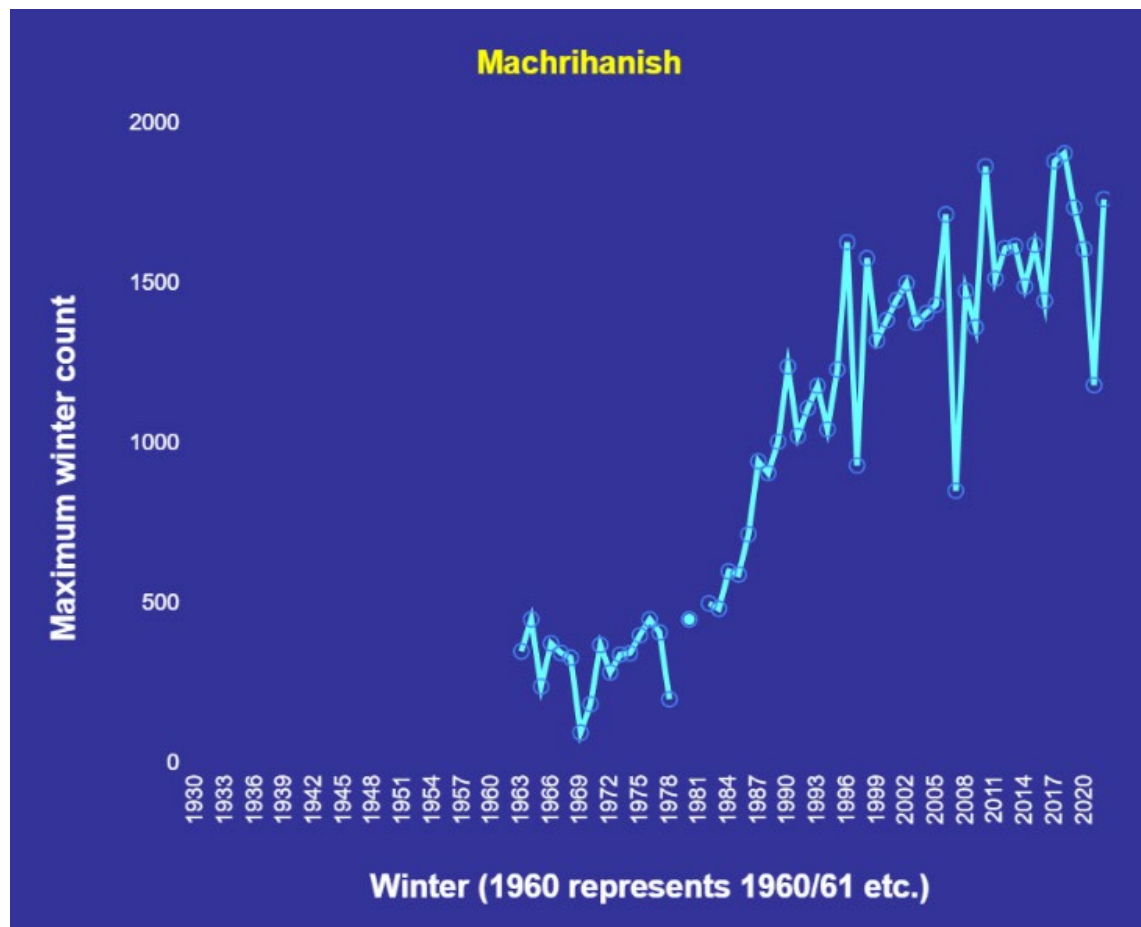


Plate 1. Peak Winter Counts of Greenland White-fronted Geese at Machrihanish Foraging Area from 1963 to 2020. From GWFGS (n.d. b).

4.3 Effects Resulting from Collision Mortality

- 4.3.1 As noted in section 3.5, the Proposed Varied Development is approximately 380m from the Kintyre Goose Roosts SPA (at the closest point), with the closest turbine located approximately 585m away. There is considered to be potential for birds roosting at Tangy Loch or Lussa Loch within the SPA to travel through the Proposed Varied Development turbine envelope during daily commutes to/from foraging areas and/or during migratory flights.
- 4.3.2 All collisions with turbines are anticipated to cause mortality. However, as described in section 3.4, the estimated collision rate of Greenland white-fronted goose for the Consented Development was reported as 1.9 birds over the lifetime of the Consented Development (50 years). Similarly, based on the worst-case turbine parameters for the Proposed Varied Development (i.e., 150m rotor length), the annual collision rate for Greenland white-fronted goose was 0.10 using 2016-17 data³ (one bird every ten years)

³ As noted above, some 2016-17 flights were recorded as “grey goose” by the surveyor because they could not be identified to species level. As a precautionary approach, the flights were included in the CRM for both Greenland white-fronted goose and greylag goose. Therefore, CRM estimates for one or both species will be overestimated.

and 0.07 using the 2025-26 data (one bird every 14.3 years). The latter would equate to 5 birds during the 50 year-year lifetime of the Proposed Varied Development. Full details of the CRM are presented in **Technical Appendix 6.1** within **Volume 4** of this EIA Report.

- 4.3.3 Estimated collision rates are low because most of the Greenland white-fronted goose flight paths were between Tangy Loch and Lussa Loch and foraging areas to the south (likely Machrihanish), with few flights (i.e., seven flights during the 2025-26 VP surveys for Proposed Varied Development and up to ten³ flights during 2016-17 VP surveys for the Consented Development) entering the Proposed Varied Development turbine envelope, as seen in **Figure 6.5** within **Volume 3a** of this EIA Report and in **Figure 9.6** of the 2018 EIA Report for the Consented Development.
- 4.3.4 The worst-case estimated annual collision rate for the Proposed Varied Development (0.10) corresponds to the potential loss of 0.004% of the Kintyre Goose Roosts SPA Greenland white-fronted goose population at designation (2,300 birds; SNH, 1998).
- 4.3.5 As discussed in **Chapter 6**: within **Volume 2** of this EIA Report, collision risk values are based on a number of assumptions, which makes the results highly precautionary, and not necessarily realistic in ecological terms. Additionally, the majority of Greenland white-fronted goose flights falling within the turbine envelope did not actually approach or cross it, with birds tending to follow flight paths to the east or south. As such, it unlikely that such flights would be at risk of collision, even if they overlap with the turbine envelope, which includes a 575m buffer of the proposed turbine locations.
- 4.3.6 As such, collision risk from the Proposed Varied Development will not undermine the conservation objectives of the SPA, particularly objective 2a, which aims to maintain the *“population of the species as a viable component of the site”* (NatureScot, n.d.).
- 4.3.7 No mitigation is considered to be required to reduce collision mortality effects on the Kintyre Goose Roosts SPA population of Greenland white-fronted goose from the Proposed Varied Development alone.

4.4 Effects Resulting from Barrier Effects to Movement

- 4.4.1 Barrier effects can occur when birds are deterred from their usual flight routes between roosts or breeding sites and their feeding areas by a physical or perceived barrier to movement. Wind turbines can potentially create such barriers, displacing birds from preferred airspace and increasing energetic costs as they fly around or over wind farms. Some species can potentially display strong avoidance at the scale of entire arrays (macro-avoidance or displacement), taking evasive routes around wind farms rather than reacting to individual turbines or blades.
- 4.4.2 When displacement forces birds to use alternative routes, they may incur additional energy expenditure. This impact is amplified if a single large array, or several neighbouring wind farms cumulatively, forms a broad barrier which could lead to substantial extra energetic costs or potentially even abandonment of roosts or feeding sites.
- 4.4.3 Studies at large offshore wind farms indicate that geese in flight prefer to avoid an entire turbine envelope, either by gaining height to fly over the turbines or by altering their flight path to fly around them (Plonczkier & Simms, 2012). There is less evidence of barrier effects from onshore wind farms, although a recent study in Denmark showed vertical and horizontal avoidance of large turbines by geese and other large-bodied birds (Therkildsen *et al.*, 2021). Therefore, there is potential for onshore wind farms sited between roost and feeding sites to create barrier effects, by increasing the energetic costs of geese forced to alter their preferred flight paths (NatureScot, 2025c).
- 4.4.4 As stated in section 3.4 and seen in **Figure 6.5** and **Figure 6.1** within **Volume 3a** of this EIA Report and in **Figures 9.6, 9.25** and **9.26** of the 2018 EIA Report for the Consented Development, Greenland white-fronted geese flights near to the Site were predominately

to the south-east, around Tangy Loch and Lussa Loch. Most flights show a clear route between the two lochs and the foraging grounds to the south (likely Machrihanish), with geese following a flight corridor to the east of the Proposed Varied Development. Very few flights overlapped with the turbine envelope.

- 4.4.5 The VP surveys for the Consented Development and the Proposed Varied Development did not record any flights which indicated direct northern travel from Tangy Loch or direct southern travel towards Tangy Loch. This suggests that birds roosting at Tangy Loch do not typically fly directly to the northern feeding areas of Kintyre, i.e., Rhunahaorine, Clachan, Gigha and Glenbarr, and are therefore not required to cross the Site to reach these foraging grounds. In contrast, the GWFGS states that “*a few [Greenland white-fronted geese] fly as far as Tangy Loch*” to roost after feeding at Rhunahaorine (GWFGS, n.d. a), although numbers of birds and frequency of flights are not clarified. If birds do travel between Tangy Loch or Lussa Loch and the northern foraging areas, they may be following an alternative route which does not pass over the turbine envelope of the Proposed Varied Development. For example, the geese may leave the Tangy Loch/Lussa Loch roosting area in a south-west direction, towards the coast, before eventually heading north to the foraging grounds.
- 4.4.6 Based on the baseline survey data and supporting desk study information, it is considered unlikely that the Proposed Varied Development alone would create barrier effects during any migratory flights or daily flights between the Tangy Loch/Lussa Loch roost sites and foraging grounds.
- 4.4.7 No mitigation is considered to be required to reduce barrier effects on the Kintyre Goose Roosts SPA population of Greenland white-fronted goose from the Proposed Varied Development alone.

4.5 Effects Resulting from Artificial Light

- 4.5.1 Due to the proposed increase in turbine tip height for the Proposed Varied Development, and in accordance with Civil Aviation Authority (2016) guidance, it is a requirement for aviation lighting to be installed on the turbines to increase their visibility to aircraft pilots (as detailed in **Volume 4, Technical Appendix 5.10: Landscape and Visual Assessment of Aviation Lighting**).
- 4.5.2 For the Proposed Varied Development, the five outermost turbines (T1, T5, T6, T8 and T11) require visible red lighting. Lighting will be positioned at hub height (approximately 150m) so that it remains visible to aircraft in conditions of low cloud and poor visibility. Any light spill reaching ground level will be significantly less intense than at hub height and will decrease further with distance from each turbine. As a result, illumination will be greatest at 150m, with substantially lower levels at ground level below the turbine, with even lower levels at ground level with increased distance from the turbine.
- 4.5.3 Artificial lighting is known to have both positive effects on birds (i.e., increased opportunity for activity that would normally only occur during daylight) and negative effects, including attraction to lights (phototaxis), disruption of photoperiodicity and increased predation due to opportunities for visually active predators (NatureScot, 2020). Birds are often attracted to lights, especially certain taxonomic groups and nocturnal migrants (NatureScot, 2020), although, the reasons for phototaxis are not fully known. Theories include navigation by moonlight, attraction to phosphorescence (for some seabirds) and interference with the magnetic compass of birds which may affect orientation.

Attraction and Collision Risk

- 4.5.4 There is limited published literature on the impact of turbine lighting on birds, though it has been shown that brightly lit offshore turbines could cause high collision rates in poor

weather conditions (Huppopp *et al.*, 2006); and illuminated onshore turbines tend to have higher collision rates than unlighted ones (Ballasus *et al.*, 2009). The range of colours can also alter collision risk. For example, a review by Kerlinger & Kerns (2003) found that steady burning red lights on turbines resulted in the strongest attraction by migrant bird species; whereas no large-scale fatalities occurred at wind farms where flashing red lights were installed. Gehring *et al.* (2009) studied a range of lighting on communication towers and found white, stroboscopic lights attracted fewest birds compared to red flashing lights and steady red lights. The study suggested that whether lights flash or remain steady is the main factor influencing collision risk, with colour being a secondary consideration.

- 4.5.5 Although the Proposed Varied Development turbines are planned to have steady, red aviation lights, geese are not among the species most likely to be attracted to aviation lighting and thereby susceptible to increased collision risk (NatureScot, 2020). It is considered unlikely that Greenland white-fronted geese would be attracted to turbine lighting at the Proposed Varied Development, especially given the evidence from baseline surveys (see section 3.4) which shows very few recorded flights (i.e., one flight during baseline surveys for Proposed Varied Development and two flights during baseline surveys for Consented Development) crossed the turbine envelope. The majority of flights followed a flight path to the east of the Site, which indicated direct south-west to north-east travel from the southern foraging areas to nearby roosting lochs (Tangy Loch and Lussa Loch). Furthermore, it is possible that the increased turbine visibility could reduce collision risk, particularly in poor visibility conditions.
- 4.5.6 Based on the baseline survey data and supporting desk study information, it is considered unlikely that the aviation lighting at the Proposed Varied Development alone would increase the risk of collision to SPA birds during any migratory flights or daily flights between the Tangy Loch/Lussa Loch roost sites and foraging grounds.
- 4.5.7 No mitigation is required to reduce collision risk to the Kintyre Goose Roosts SPA population of Greenland white-fronted goose from the Proposed Varied Development alone.

Displacement and Barrier Effects

- 4.5.8 Aviation lighting also has the potential to create a barrier effect on geese flying at night. Lighting effects at wind farms have been shown to increase avoidance distances, and evidence from radar studies has found that higher altitudes are associated with nocturnal flights (Desholm & Kahlert, 2005). Geese have been found to be active at night and in poor visibility conditions during migration and moving between roosting and foraging areas (Hill, 1992). However, as discussed above (and in section 3.4), survey results showed that few recorded flights (i.e., seven flights during 2025-26 VP surveys for the Proposed Varied Development and up to ten flights⁴ during 2016-17 VP surveys for Consented Development) were within the turbine envelope, and the Proposed Varied Development is not located along any well-established flight corridors between roosting and feeding areas. As such, it is considered unlikely that the turbine lighting will create a barrier effect.
- 4.5.9 Based on the baseline survey data and supporting desk study information, it is considered unlikely that the aviation lighting at the Proposed Varied Development alone would create barrier effects during any migratory flights or daily flights between the Tangy Loch/Lussa Loch roost sites and foraging grounds.

⁴ Some flights were recorded as “grey geese” and may not have been Greenland white-fronted geese but were included in the CRM as a precaution.

- 4.5.10 No mitigation is considered to be required to reduce barrier effects on the Kintyre Goose Roosts SPA population of Greenland white-fronted goose from the Proposed Varied Development alone.

Disturbance to Tangy Loch Roost

- 4.5.11 Aviation lighting on the turbines could have potential effects on Greenland white-fronted geese roosting on Tangy Loch if birds are deterred from using the loch due to disturbance from the increased visibility of the turbines, or from an actual or perceived increase in predation risk increasing vigilance while roosting. Of the five turbines to be lit, the closest turbine to Tangy Loch is T5 which lies approximately 584.5m away. All turbines will be lit at 200 candela (cd) intensity for 98% of the time and will only be increased to 2000cd during conditions of poor visibility. The aviation lighting on T5 would be located at approximately 288m Above Sea Level (ASL). Tangy Loch lies at approximately 136m ASL. This gives a 152m difference in height between the light source and the loch surface. The centre of Tangy Loch lies 840m from T5 meaning that the loch would lie below the primary beam spread of the aviation light. Based on the distance between the turbines and Tangy Loch (over 500m) the potential for significant light spill on the loch is considered to be minor.
- 4.5.12 Based on the above, it is considered unlikely that the aviation lighting at the Proposed Varied Development alone would cause disturbance effects to SPA birds roosting at Tangy Loch, nevertheless, precautionary mitigation is proposed below.

Mitigation

- 4.5.13 Due to the proximity of Tangy Loch and the regular use by Greenland white-fronted geese it is recommended that low intensity lighting is used 100% of the time to further reduce light spill, which would minimise potential disturbance to this species.

4.6 Effects Resulting from Disturbance/Displacement

- 4.6.1 As noted in section 3.5, at the closest point, the Proposed Varied Development is approximately 380m from Tangy Loch, which is part of the Kintyre Goose Roosts SPA. As the recommended disturbance buffer for non-breeding white-fronted goose is 200-600m (NatureScot, 2022), there is potential for birds roosting within the SPA at Tangy Loch to be disturbed during the construction and decommissioning phases of the Proposed Varied Development. All other SPA lochs are located over 750m away from the Proposed Varied Development. As such, there is not considered to be any potential birds roosting on these lochs to be disturbed due to construction or decommissioning works and the assessment of this impact relates to birds roosting on Tangy Loch only.
- 4.6.2 The Proposed Varied Development layout has minimally changed from the Consented Development. The closest elements to Tangy Loch are:
- Permanent mast – 380.1m;
 - Borrow pit E – 569.4m;
 - Turbine 5 – 584.5m;
 - Borrow pit A – 585.3m; and
 - Turbine 4 – 843.7m.
- 4.6.3 All other elements of the Proposed Varied Development are over 1km away from Tangy Loch.
- 4.6.4 As summarised in Table 3.2, roosting flocks were present on Tangy Loch, which is within potential disturbance distance of the Proposed Varied Development (200-600m);

NatureScot, 2022) during most survey months (October, December, February, March, April and possibly November) with numbers of roosting birds ranging from six to 1,315. The peak flock size of 1,315 represents 57.2% of the SPA population.

- 4.6.5 Baseline data for the Consented Development show a peak count of 480 geese roosting at Tangy Loch in November 2013, which represents 21% of the SPA population at designation.

Mitigation

- 4.6.6 Given the large proportion of the Kintyre Goose Roosts SPA population that could be impacted due to disturbance/displacement during construction and decommissioning of the Proposed Varied Development, mitigation will be implemented.
- 4.6.7 Additionally, the determination for the Consented Development included the following planning condition and it is expected that a similar condition will be imposed for the Proposed Varied Development:
- 4.6.8 “Planning Condition 23. Construction and Decommissioning Hours within 1 Kilometre of Tangy Loch**
- 4.6.9 *During construction and decommissioning all works within 1 kilometre of Tangy Loch are restricted to between the hours starting from one hour after dawn to one hour before dusk during the goose roosting season (30 September - 30 April).*
- 4.6.10 **Reason:** *To avoid risk of disturbance to the over wintering population of Greenland white fronted goose.”*
- 4.6.11 The exact mitigation measures to be implemented during construction of the Proposed Varied Development will be detailed in a Goose Protection Plan (GPP) and will be determined post-consent in consultation with NatureScot but will be in line with the proposed mitigation outlined in **Chapter 9: Ornithology** of the 2018 EIA Report for the Consented Development (MacArthur Green for SSE, 2018a) and would likely include the measures outlined below.
- As far as possible, construction works within 1km of Tangy Loch will commence after 30th April, and will be completed in the shortest possible timeframe, ideally no later than 30th September in the following calendar year. This will ensure that potential disturbance is minimised as far as possible, by minimising the likelihood for construction works to overlap with the non-breeding season.
 - Before work starts, a construction schedule that avoids disturbing geese using Tangy Loch and Lussa Loch shall be prepared and submitted to, and approved by, Argyll and Bute Council in consultation with NatureScot. Contractors must follow the approved schedule for the entire construction period.
 - Where construction works overlap with the non-breeding season (September to mid-May⁵), a suitably experienced Ecological Clerk of Works (ECoW) will attend the Site regularly throughout the season to oversee implementation of the GPP, including any monitoring required, and identify any potential constraints to works and/or reactive mitigation needs.
 - During the non-breeding season⁵, construction activities, vehicle movements and other on-site operations within 1km of Tangy Loch shall normally be restricted to the hours from one hour after sunrise to one hour before sunset.

⁵ Defined as the period between 30th September and 30th April for consistency with Planning Condition 23 for the Proposed Varied Development, but the period may be shortened by the Ecological Clerk of Works if birds arrive later than 30th September or depart before 30th April.

- In the event of work within 1km of Tangy Loch being required outside these hours during the non-breeding season⁵, e.g., abnormal load deliveries, commissioning works or emergency mitigation works, one or more of the following mitigation measures will be applied, with the most appropriate measure(s) to be determined by the ECoW:
 - Implementation of a minimum 600m buffer around Tangy Loch, within which construction works are excluded between one hour before sunset to one hour after sunrise.
 - A watching brief by the ECoW during any construction works within 600m of Tangy Loch between one hour before sunset to one hour after sunrise to monitor any birds present for signs of disturbance.
 - Where signs of disturbance to roosting birds are observed by the ECoW, all works within 600m of Tangy Loch will stop as soon as it is safe to do so and will not recommence until the ECoW has confirmed the birds are no longer present.
- Where possible, any blasting taking place on Site will avoid the non-breeding season⁵. Where this is unavoidable, blasting will only be carried out during the period from one hour after sunrise to one hour before sunset.
- Use of artificial lighting in areas within 600m of Tangy Loch during the non-breeding season will be restricted to the period between sunrise and sunset, and any artificial lighting elsewhere on Site during the non-breeding season will be directed away from Tangy Loch.

4.6.12 As decommissioning works are likely to be of a similar nature and duration as construction activities, the mitigation outlined above will also be implemented during the decommissioning phase, following review and update (if required) to ensure compliance with relevant guidance and legislation at the time.

4.7 Assessment of Effects on Site Integrity

- 4.7.1 An assessment of whether the potential LSEs from the Proposed Varied Development alone identified during the Screening stage could undermine the conservation objectives of the Kintyre Goose Roosts SPA is presented in Table 4.2.
- 4.7.2 Note that the assessment presented in Table 4.2 assumes that the mitigation outlined in section 4.6.6 will be fully implemented.
- 4.7.3 If a plan or project does not undermine the conservation objectives of a European site, then the integrity of the site should be maintained (NatureScot, 2025e) and it can be concluded that there will be no adverse effect on site integrity (AESI).

Table 4.2: Appropriate Assessment of the Impacts of the Proposed Varied Development Alone on the Greenland White-Fronted Goose Qualifying Interest Feature of the Kintyre Goose Roosts SPA in View of its Conservation Objectives

Conservation Objective	Relevant Impacts	Relevant Mitigation	Assessment of Residual Effects	Conclusion
1. To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained	Noise and visual disturbance and/or displacement of roosting birds during construction and decommissioning	Mitigation delivered via the GPP (outlined in section 4.6.6), which will be finalised in consultation with NatureScot and is likely to include the following measures: • Timing of works periods to avoid or minimise overlap with the non-breeding season when Greenland white-fronted geese may be present; • Timing of daily works within 1km of Tangy Loch, or any blasting anywhere on Site, to avoid nocturnal hours when Greenland white-fronted geese are more likely to be present; • Regular Site attendance by an ECoW throughout the non-breeding season to oversee implementation of the GPP and identify any potential constraints to works and/or reactive mitigation needs; • Where essential works are required outwith the recommended periods, targeted mitigation (exclusion buffers and watching briefs) to ensure that any roosting birds are not disturbed; and • Restricting times that artificial lighting can be used within 600m of Tangy Loch during the non-breeding season and sensitive placing of artificial lights outwith this buffer to avoid disturbance of roosting birds.	There are not predicted to be any effects on habitat quality within the SPA. As detailed in section 4.6, the potential for disturbance/displacement of roosting birds during construction will be minimised through implementation of mitigation delivered via the GPP. Although some potential for disturbance/displacement of roosting birds remains during construction, this will be minimal and the works will be temporary (it is expected that construction will take 23 months, affecting two non-breeding seasons at most during the construction period). It is anticipated that any birds temporarily displaced may use the nearby Lussa Loch as an alternative roost site and are likely to make use of Tangy Loch again post-construction.	No AESI
	Visual disturbance of roosting SPA birds due to artificial lighting (on the turbines)	Reduction of intensity of lighting on closest turbine (T5) to 200cd 100% of the time.	As detailed in section 4.5, there is not expected to be significant disturbance of roosting birds on Tangy Loch due to artificial lighting on turbines during the operational phase. Of the five turbines proposed for lighting, T5 is the nearest to Tangy Loch, at approximately 584.5m from the western edge and around 840m from the centre of the loch. At this separation distance, the	No AESI

Shadow HRA Report

Conservation Objective	Relevant Impacts	Relevant Mitigation	Assessment of Residual Effects	Conclusion
	during the operational phase		aviation lighting is considered unlikely to result in appreciable light spill reaching the roost area and the implementation of mitigation will further reduce light spill onto Tangy Loch. As such, any potential for disturbance to birds using Tangy Loch is considered negligible with no potential for turbine lighting to significantly impact the SPA population in the long term.	
2a: To ensure that the population as a viable component of the site is maintained in the long term	Collision mortality throughout the operational phase	None proposed.	As detailed in section 4.3, the estimated collision rate of Greenland white-fronted goose was reported as low for the Consented Development (1.9 birds every 50 years) and the Proposed Varied Development (five birds every 50 years as a worst-case scenario). Both CRM estimates represent less than 1% of the Kintyre Goose Roosts SPA population (2,300 birds at designation; SNH, 1998). Additionally, as detailed in section 4.5, artificial lighting on turbines is not expected to increase the collision risk to Greenland white-fronted geese using the Tangy Loch roost. As such there is not considered to be any potential for collision mortality to significantly impact the SPA population in the long term.	No AESI
2b. To ensure that distribution of the species within site is maintained in the long term	Noise and visual disturbance and/or displacement of roosting birds during construction and decommissioning	See summary of mitigation above.	As noted above, disturbance/displacement of roosting birds will be minimised through mitigation. Although some potential for disturbance/displacement of roosting birds remains, construction will be temporary, including or overlapping two non-breeding seasons at most. It is considered that birds will continue to roost within the Kintyre Goose Roosts SPA, with any displacement of roosting birds from Tangy Loch considered to be short-term and reversible.	No AESI
	Barrier effects resulting in an alteration of typical flight paths during the operational phase	None proposed.	As detailed in sections 4.4 and 4.5, barriers to the movement of Greenland white-fronted geese from the SPA are not expected to arise as a result of the Proposed Varied Development. Baseline data collected at the Site suggests geese very rarely fly through or over the Site. Flights were concentrated to the east of the Site, around Tangy Loch and Lussa Loch with flights in this area typically coming from or heading south where the Machrihanish foraging area is. Additionally, suitable flight corridors between Tangy and Lussa Lochs and foraging grounds along the west coast of Kintyre are available to the north and south of the Proposed Varied Development and birds would not be required to take large detours to avoid it. Moreover, operational turbines are already present on the Site, and the Proposed Varied Development turbine locations are very similar to the Consented	No AESI

Conservation Objective	Relevant Impacts	Relevant Mitigation	Assessment of Residual Effects	Conclusion
			Development. Therefore, the Proposed Varied Development will not significantly alter the flight paths taken and is not anticipated to alter the distribution of the species within the SPA in the long term.	
2c. To ensure that the distribution and extent of habitats supporting the species are maintained in the long term	Not applicable – no potential LSEs due to effects on supporting habitats, either from the Proposed Varied Development alone or in-combination with other developments			
2d. To ensure that structure, function and supporting processes of habitats supporting the species are maintained in the long term	Not applicable – no potential LSEs due to effects on supporting habitats, either from the Proposed Varied Development alone or in-combination with other developments			
2e. To ensure that there is no significant disturbance of the species in the long term	Noise and visual disturbance and/or displacement of foraging birds during construction and decommissioning	See summary of mitigation above.	As noted above, disturbance/displacement of roosting birds will be minimised through mitigation. Although some potential for disturbance/displacement of roosting birds remains, construction and decommissioning of the Proposed Varied Development will be temporary, including or overlapping two non-breeding seasons at most. Following construction (and decommissioning), it is anticipated that birds will return to roost at Tangy Loch.	No AESI
	Visual disturbance of roosting SPA birds due to artificial lighting (on the turbines) during the operational phase	Reduction of intensity of lighting on closest turbine (T5) to 200cd 100% of the time.	As detailed in section 4.5, there is not expected to be significant disturbance of roosting birds on Tangy Loch due to artificial lighting on turbines during the operational phase. Of the five turbines proposed for lighting, T5 is the nearest to Tangy Loch, at approximately 584.5m from the western edge and around 840m from the centre of the loch. At this separation distance, the aviation lighting is not considered likely to result in appreciable light spill reaching the roost area and the implementation of mitigation will further reduce light spill onto Tangy Loch. As such, any potential for disturbance to birds using Tangy Loch is considered negligible with no potential for turbine lighting to significantly impact the SPA population in the long term.	

4.8 In-Combination Effects

Introduction

- 4.8.1 The potential for the Proposed Varied Development to have an effect on the Kintyre Goose Roosts SPA in-combination with other plans and projects is assessed below with reference to NatureScot (2025e) guidance.
- 4.8.2 The assessment of in-combination effects focuses on collision mortality and barrier effects to Greenland white-fronted geese during operation, and disturbance/displacement of roosting birds during construction of the Proposed Varied Development. In-combination disturbance/displacement decommissioning effects are anticipated to be the same as those during the construction phase.

Other Plans and Projects

- 4.8.3 Greenland white-fronted geese are considered to have a core foraging range of 5-8km (SNH, 2016). Therefore, the in-combination assessment considers developments within an 8km buffer of the Kintyre Goose Roosts SPA, which is considered to be a proportionate approach. These developments are listed in Table 4.3 with their locations shown in **Figure 6.18** within **Volume 3a** of this EIA Report.
- 4.8.4 Projects that are currently at the scoping stage and for which no impact assessment is publicly available have been scoped out of the in-combination assessment. Additionally, projects which have been refused, withdrawn, or for which the status is unknown, have been scoped out of the in-combination assessment.
- 4.8.5 The Tangy IV Wind Farm and Cnoc Buidhe Wind Farm 132 kV Overhead Line (OHL) Shared Use Connection (Scottish and Southern Energy Networks (SSEN), 2025) is a grid connection project in the scoping planning phase (Scoping Report submitted in March 2025). However, although detailed information is not currently available, it has been included in the assessment of in-combination effects because it will be required for the Proposed Varied Development to operate.
- 4.8.6 For in-combination effects of collision mortality, all projects which calculated the collision risk to Greenland white-fronted geese were scoped in.
- 4.8.7 For in-combination effects of barriers to movement, all projects which present a possible barrier effect between Greenland white-fronted goose roosts and foraging areas were scoped in.
- 4.8.8 For in-combination effects of disturbance/displacement, only developments within 1km of the SPA roosts (Tangy Loch, Lussa Loch, Black Loch, Loch Garasdale, Loch an Fhraoich, Rhunahaorine), and thus potentially within the disturbance range of Greenland white-fronted geese (200-600m; NatureScot, 2022), were scoped in. The Cnoc Buidhe Energy Hub (Belltown Power, 2025c) meets the criteria; however, it was scoped out since all geese recorded roosting at Lussa Loch during baseline surveys were over 1.5km from the proposed development. Therefore, in the absence of mitigation, the significance of the effects of disturbance/displacement was considered to be negligible and not significant in EIA terms.

Shadow HRA Report

Table 4.3: Projects Scoped into the Assessment of In-combination Effects on the Greenland White-Fronted Goose Qualifying Interest Feature of the Kintyre Goose Roosts SPA, Listed in Order of Proximity to the Proposed Varied Development

Development	Distance from Proposed Varied Development (km)	Distance from SPA (km)	Status	No. Turbines	Collision rate (99.8% avoidance)*	Scoped In or Out of In-combination Assessment		
						Collision Mortality	Barrier Effects	Disturbance/ Displacement
Proposed Varied Development	-	0.38	Application	16	0.103**	✓	✓	✓
Cnoc Buidhe Energy Hub	0.00	0.20	Application	9	0.003	✓	✓	✗
Beinn an Tuirc (Phase 3)	2.40	0.81	Operational	18	0.110	✓	✓	✗
Blary Hill	4.43	3.05	Operational	14	-	✗	✓	✗
Auchadaduie	4.92	4.35	Operational	3	0.080	✓	✓	✗
Allt Domhain	6.10	4.20	Application	9	-	✗	✓	✓
Beinn an Tuirc (Phase 1)	6.31	3.96	Operational	46	-	✗	✓	✗
Tangy IV Wind Farm and Cnoc Buidhe Wind Farm 132 kV OHL Shared Use Connection	TBC	TBC	Scoping	-	-	✓	✓	✓
West Torrisdale	8.33	5.72	Application	9	-	✗	✗	✓
Clachaig Glen	9.71	3.10	Consented	14	-	✗	✗	✗
Deucheran Hill	10.50	1.54	Operational	9	-	✗	✗	✗
Killean	13.13	0.49	Application	9	0.260	✓	✗	✗
Beinn an Tuirc (Phase 2)	14.02	2.74	Operational	19	0.000	✓	✓	✗
Gigha Community	16.94	6.31	Operational	4	-	✗	✗	✗
Cour	19.07	2.71	Operational	10	0.018	✓	✗	✗
High Constellation	20.72	0.44	Consented	10	0.070	✓	✗	✗
Eascairt	26.66	5.71	Consented	13	-	✗	✗	✗
Freasdail	>30.0	8.50	Operational	11	0.441	✓	✗	✗
Total					1.085			

*if assessed for Greenland white-fronted goose; **based on the worst-case turbine parameters (i.e., 150m rotor length) and highest predicted annual risk of the two years included in CRM (2016-17 and 2025-26)

Assessment of In-combination Effects

- 4.8.9 The potential in-combination effects of collision mortality, barrier to movement and disturbance/displacement on Greenland white-fronted geese from the Kintyre Goose Roosts SPA population are detailed below.

Collision Mortality

- 4.8.10 As detailed in Table 4.3, the in-combination collision mortality rate of all wind farm developments (with available CRM data) within 8km of the Kintyre Goose Roosts SPA is 1.085 birds per year. This represents 0.047% of the SPA population at the time of designation (2,300 birds; SNH, 1998). Although it is acknowledged that the Tangy IV Wind Farm and Cnoc Buidhe Wind Farm 132 kV OHL Shared Use Connection could result in additional collision risk, particularly to any birds occasionally commuting between roost sites at the Tangy/Lussa lochs and Loch Arnicle, it is anticipated that Greenland white-fronted geese would likely be commuting at altitudes that exceed the height of the OHL. It is further anticipated that appropriate mitigation, such as line marking on sections of the OHL, would be implemented if required to reduce collision risk to a non-significant level.
- 4.8.11 NatureScot estimates that *“for the Kintyre sub-population [of Greenland white-fronted geese], additional mortality in excess of 10 or 15 individuals per year increases the probability of a decline below the starting size by 5% depending on the parameter set used”* (Trinder, 2015). As the potential additional mortality rate from in-combination collision effects is so low, it is not expected to have a significant impact on the SPA population and therefore will not undermine the conservation objectives of the site. Additionally, Greenland white-fronted geese show a high avoidance rate (estimated at 99.8% by NatureScot) and CRM estimates are generally highly precautionary and represent the worst-case scenario. Based on this, the number of collisions is likely to be less than those estimated.
- 4.8.12 The previous AA conducted by Scottish Ministers in 2019 also concluded that *“the current cumulative mortality is not at a level which will impact the SPA population”* based on a combined CRM rate of 0.475 birds per year (Scottish Ministers, 2019).
- 4.8.13 It is concluded that due to the low estimated collision rate of the Proposed Varied Development and other projects, there will be no AESI of the Kintyre Goose Roosts SPA as a result of in-combination collision risk to the qualifying feature, Greenland white-fronted goose.

Barrier Effects

- 4.8.14 Barrier effects from wind farms result in birds using alternative routes and, where multiple wind farms exist in an area, this could potentially create significant changes in flight paths between roost sites and foraging grounds or during migratory flights, thus causing additional energy expenditure or even abandonment of roosts/feeding sites.
- 4.8.15 Since the two populations of Greenland white-fronted geese are documented as using different areas across Kintyre (see section 4.2.4; SNH, 2011), it is anticipated that only developments which lie between Tangy Loch/Lussa Loch and the Machrihanish foraging area should be scoped into the assessment of in-combination effects. However, as a precaution, developments between Tangy Loch/Lussa Loch and the Glenbarr foraging areas or the Loch Arnicle ‘satellite roost’ have also been scoped in (as shown in Table 4.3).
- 4.8.16 As discussed in sections 3.4 and 4.4, baseline surveys did not show evidence that Greenland white-fronted geese regularly cross the Proposed Varied Development, further indicating it does not fall under a well-used flight path.

- 4.8.17 To better illustrate the flight paths of the Greenland white-fronted geese from the Kintyre Goose Roosts SPA, a desk study has been completed, including a review of the Additional Environmental Information Ornithology Report (AEI) for Cnoc Buidhe Wind Energy Hub (Belltown Power, 2025a), which is adjacent to the northern red line boundary of the Site. The AEI gathered data on Greenland white-fronted geese from six developments (including Tangy III and the Consented Development) within 5km of the proposed Cnoc Buidhe site, as well as satellite tag data from Dr. Larry Griffin. The relevant findings (excluding Tangy III and the Consented Development) are summarised below along with the results of the baseline surveys at Cnoc Buidhe:
- Allt Domhain (Energyfarm Allt Domhain Ltd, 2025): nine-turbine development 6.10km north/north-east from the Proposed Varied Development. Ten Greenland white-fronted geese flights were recorded during surveys conducted in the non-breeding seasons 2018-2020, though none were recorded during VPs in 2024/2025. The majority of flights were associated with Loch Arnicle, and no flights were recorded taking a direct southern route.
 - Auchadaduie (Fyne Futures Ltd., 2011): three-turbine operational development which lies 5.41km north of the Proposed Varied Development, beside Blary Hill Wind Farm. Surveys in 2009-10 and 2012-13 found Loch Arnicle was used intermittently by Greenland white-fronted geese as a winter roost, with a maximum count of 68 birds. Recorded flights were predominantly east–west between Loch Arnicle and foraging areas near Glenbarr. No barrier effects were predicted for the Auchadaduie site.
 - Beinn an Tuirc 3 (Scottish Power Renewables, 2013): 14-turbine operational development which lies east/north-east of Lussa Loch and 2.40km from the Proposed Varied Development. Surveys in 2011/2012 and 2012/2013 recorded 236 Greenland white-fronted geese flights; all but four flights originated in the vicinity of the Lussa Loch roost, and 95% of arrivals at Lussa Loch approached from the south, southwest or west. Five flights (70 birds) arrived from the east or north. Dawn observations showed 86% of departures left to the south or southwest, with the remaining ten flights (151 birds) heading north or northwest. In the 2012/2013 non-breeding season, geese were recorded roosting at Lussa Loch between October and December, with a peak number of 1,028 birds, though none were recorded in January to April.
 - Blary Hill (RES, 2014): 14-turbine operational development which lies 4.43km north of the Proposed Varied Development. Baseline surveys in 2010-11 and 2011-12 recorded Greenland white-fronted geese on 48 occasions, showing two main flight corridors: north of Blary Hill, running south-west to north-east along Barr Glen; and another to the south of Blary Hill running east to west from Loch Arnicle towards Barr Glen.
 - Satellite-tag data (from Dr. Larry Griffin and summarised in Belltown Power, 2025): data collected from 33 satellite tagged Greenland white-fronted geese around the Kintyre Peninsula across non-breeding seasons from 2014-15 to 2023-24. This data contained only three birds which were potentially using a flight route between the Tangy Loch/Lussa Loch roosts and the Tayinloan/Glenbarr foraging areas or the Loch Arnicle satellite roost. Overall, seven movements were thought to link Lussa Loch and the Glenbarr area, however the exact flight path taken cannot be distinguished from satellite data.
 - Cnoc Buidhe Energy Hub (Belltown Power, 2025a; 2025b): application for 29-turbine development immediately north of Proposed Varied Development. Surveys in 2021/2022 and 2022/2023 recorded 16 Greenland white-fronted goose flights with roosting at Lussa Loch. No roosting was observed at Loch Arnicle, though four flights were recorded around it. Two flights originated from the west and south of Loch Arnicle and headed in a northern direction towards Blary Hill; while the other two

flights originated just south of Loch Arnicle with one heading north and the other south. The two flights appear to have come from the west, and the flight trajectory suggests they may have passed over the proposed Cnoc Buidhe site, though this is uncertain.

- 4.8.18 Additionally, the Tangy IV Wind Farm and Cnoc Buidhe Wind Farm 132 kV OHL Shared Use Connection Scoping Report (SSEN, 2025) was reviewed. The preliminary results (from 2022-23 surveys) included 53 flights by Greenland white-fronted goose, which were reportedly all associated with Tangy Loch and Lussa Loch and were at the southern edge of the proposed OHL (no Figure was available), suggesting that few flights cross the OHL. It is acknowledged that Greenland white-fronted goose flights between the Tangy/Lussa roost lochs and Loch Arnicle to the north have occasionally been recorded and the OHL may cross this flight corridor. However, it does not appear to be used regularly and, even if birds are deterred from crossing the OHL, it is considered that they could still follow this flight corridor by flying to the west of the OHL. As such, it is considered unlikely that the OHL would result in significant displacement of Greenland white-fronted geese. This will be fully assessed as part of the assessment for the OHL.
- 4.8.19 Given the proximity of the Proposed Varied Development to the proposed Cnoc Buidhe site (see **Figure 6.14** within **Volume 3a** of this EIA Report), any flights from Tangy Loch to feeding areas in the north which crossed Cnoc Buidhe, might also cross the Proposed Varied Development. However, very few flights (1.6-2% of 445 flights recorded during the 2009-2025 baseline surveys of the six developments reviewed in the AEI report) originating from the direction of Lussa Loch or Tangy Loch crossed the proposed Cnoc Buidhe site (Belltown Power, 2025a). The lack of north-westerly flights coming from the Tangy Loch/Lussa Loch area suggests birds don't regularly commute between these lochs and feeding areas to the north, with flight paths from the Proposed Varied Development and the Consented Development strongly suggesting the main feeding areas are to the south.
- 4.8.20 The geese which intermittently roost at Loch Arnicle (7km north/north-east of Tangy Loch) typically feed in the Glenbarr area to the west of the loch (RES, 2024). Nevertheless, some flight lines from the satellite tagging data did possibly link Loch Arnicle and the Tayinloan/Glenbarr area with Lussa Loch, Tangy Loch and the Machrihanish foraging area. Birds commuting between Lussa Loch and Glenbarr would not cross the Proposed Varied Development if taking a direct flight north/north-west, though they may cross the Tangy IV Wind Farm and Cnoc Buidhe Wind Farm 132 kV OHL Shared Use Connection at its southern-most point which is directly north of Lussa Loch. Those commuting from Tangy Loch to the Glenbarr area may cross the Proposed Varied Development or the proposed OHL if they take a direct northwards flight, however there is not a lot of evidence to suggest this is a regular flight path; and it is more likely the birds are flying south-west towards the coast before heading north.
- 4.8.21 Additionally, NatureScot requested that the proposed Cnoc Buidhe development removes the five south-western turbines to maintain a clear functional corridor in between Cnoc Buidhe and the Consented Development (Tangy IV) (Belltown Power, 2026). A second AEI Report has since been produced by Belltown Power, stating that the removal of one turbine would provide a corridor of 1km between the Cnoc Buidhe and the Consented Development turbine arrays, which was considered sufficient to allow the free movement of geese to commute between the two proposed developments (Belltown Power, 2026).
- 4.8.22 It is concluded that there will be no AESI of the Kintyre Goose Roosts SPA due to barrier effects on the Greenland white-fronted goose qualifying interest feature, as data from multiple proposed and built developments show geese follow clear flight paths which typically do not overlap with the Proposed Varied Development or the proposed Cnoc Buidhe development to the north.

Disturbance/Displacement

- 4.8.23 For the assessment of in-combination effects of disturbance/displacement, projects which are situated within 1km (and therefore, potentially within disturbance distance of Greenland white-fronted geese; NatureScot, 2022) of the SPA roost sites (i.e., Tangy Loch, Lussa Loch, Black Loch, Loch Garasdale, Loch an Fhraoich or Rhunahaorine) and that are not yet operational or under construction were scoped in (Table 4.3). These developments were scoped in because the possibility of their construction phases overlapping with that of the Proposed Varied Development cannot be ruled out. Construction occurring near to multiple roost sites at the same time could potentially cause significant disturbance/ displacement to the population.
- 4.8.24 The projects scoped in and their individual species assessments are detailed below.

Allt Domhain Wind Farm (Energyfarm Allt Domhain Ltd, 2025)

- 4.8.25 Loch Arnicle is not part of the Kintyre Goose Roosts SPA, Ramsar site or SSSI, but it is occasionally used for roosting by the designated population of Greenland white-fronted goose. The loch lies approximately 1km from the proposed Allt Domhain Wind Farm. Greenland white-fronted geese were recorded on three days during VP surveys – ten flights with flock sizes ranging from ten to 1,000 birds. All observations were during 2018/2019 with no geese recorded in the non-breeding season VP surveys conducted in 2020 or 2024/2025. The majority of flights were associated with likely roosting at Loch Arnicle. However, due to the limited use of the loch observed throughout the 3 years of survey effort in the non-breeding season, the potential impact of disturbance to roosting geese at Loch Arnicle was considered to be of negligible magnitude and not significant in EIA terms, provided construction works would follow NatureScot guidance (2022) and implement a minimum 200m disturbance buffer for any geese near to the site.

West Torrisdale (Ramboll for ESB Asset Development UK Limited, 2024)

- 4.8.26 The access track of the proposed West Torrisdale Wind Farm is projected to enter the SPA, north of Lussa Loch, for approximately 100m. Therefore, there is potential for construction works to disturb roosting Greenland white-fronted geese at the SPA and an HRA was carried out. The HRA stated the portion of access track within the SPA is in an area of plantation forestry which geese are unlikely to be present in/near due to this habitat being unsuitable for the species; thus, disturbance would result from noise impacts only. The HRA concluded that disturbance effects from construction would be negligible and not significant in EIA terms, but LSE on the SPA could not be ruled out. Therefore, it was proposed that noise disturbance would be managed by timing works near to Lussa Loch outside of the non-breeding season and any works during the winter would be under ECoW supervision to avoid disturbance to geese. Furthermore, it was noted that potential disturbance would last a maximum of two wintering periods.

Tangy IV Wind Farm and Cnoc Buidhe Wind Farm 132 kV OHL Shared Use Connection (SSEN, 2025)

The southern edge of the proposed OHL is approximately 1km from the north-western edge of Lussa Loch; further north the OHL is situated approximately 1km from Loch Arnicle – an occasional satellite roost for the SPA population of Greenland white-fronted geese. Given the separation distances, the potential for disturbance of roosting birds is considered to be low. Furthermore, construction works are anticipated to last two years, which means that potential for construction disturbance to roosting Greenland white-fronted geese would be limited to two non-breeding seasons at most, while it is likely that the sections near Lussa Loch and Loch Arnicle would be built over a shorter timescale and

may not need to take place during the winter months. . An assessment of the potential effects of disturbance to roosting Greenland white-fronted geese has not been completed yet. However, it is anticipated that appropriate mitigation (such as timing works to avoid periods when geese are present) will be implemented if required to reduce any potential disturbance impacts on roosting birds due to construction of the grid connection.

- 4.8.27 For projects where any disturbance/displacement of Greenland white-fronted geese was identified, it is considered such effects would be temporary and that any displaced birds would move to other areas of suitable roosting habitat within the SPA, or potentially other lochs in the area. During construction of the Proposed Varied Development, any birds potentially disturbed and displaced from Tangy Loch are likely to move to Lussa Loch. Although the proposed Cnoc Buidhe and West Torrisdale wind farms are near to Lussa Loch, neither development recorded significant numbers of birds roosting near to the area of works. This may suggest geese roost in the south of Lussa Loch, away from the proposed developments, which was also implied by baseline results at the Consented Development as many geese flight paths to Lussa Loch were recorded ending at the south of the loch (**Figure 9.26** of the 2018 EIA Report for the Consented Development).
- 4.8.28 Furthermore, it is unclear which of the proposed developments will be consented or built and when, so the construction (and decommissioning) phases may not all overlap, which would reduce in-combination effects on Greenland white-fronted geese due to disturbance associated with construction and decommissioning.
- 4.8.29 It is concluded that, as a result of the temporary nature of disturbance/displacement effects of the Proposed Varied Development and other projects, their proposed mitigation, and the availability of alternative roost sites for birds that are temporarily displaced, there will be no AESI of the Kintyre Goose Roosts SPA due to in-combination construction (or decommissioning) disturbance/displacement effects on the Greenland white-fronted goose qualifying interest feature.

4.9 Summary of Effects on Site Integrity

- 4.9.1 Following implementation of the targeted mitigation for Greenland white-fronted goose species outlined in section 4.6.6, there is not considered to be any potential for the Proposed Varied Development, either alone or due to in-combination effects with other developments, to undermine any of the conservation objectives of the Kintyre Goose Roosts SPA. Consequently, it is concluded that there will be no AESI on this SPA.

5 Conclusion

- 5.1.1 Potential LSEs on the Greenland white-fronted goose qualifying interest feature of the Kintyre Goose Roosts SPA were identified due to the following impacts:
- Mortality due to collision with turbines during daily foraging/roosting commutes or migratory flight during the operational phase;
 - Barrier effects resulting in an alteration of typical flight paths during the operational phase;
 - Attraction or displacement of the SPA species during flight or visual disturbance of roosting SPA birds due to artificial lighting (on the turbines) during the operational phase; and
 - Noise and visual disturbance and/or displacement of roosting birds during the construction or decommissioning phases.
- 5.1.2 However, due to low collision risk and no predicted significant barrier effects, and following implementation of mitigation to minimise disturbance to Greenland white-fronted geese during construction and decommissioning, it is concluded beyond reasonable scientific doubt that there would be no adverse effects on site integrity of the Kintyre Goose Roosts SPA, either from the Proposed Varied Development alone, or in-combination with other relevant plans and projects.

6 References

- Ballasus, H., Hill, K. & Hüppop, O. (2009). Artificial light as a threat for birds and bats. *Ber. Vogelschutz*, 46: 127–157.
- Belltown Power (2025a). Cnoc Buidhe Wind Energy Hub - Additional Environmental Information (AEI): Ornithology Report.
- Belltown Power (2025b). Cnoc Buidhe Wind Energy Hub EIA: Technical Appendix 8.1: Ornithology Technical Report. February 2025.
- Belltown Power (2025c). Cnoc Buidhe Wind Energy Hub EIA: Chapter 8: Ornithology. March 2025.
- Belltown Power (2026). Cnoc Buidhe Wind Energy Hub - Additional Environmental Information 2 – Ornithology Report. January 2026.
- Desholm, M. and Kahlert, J. (2005). Avian collision risk at an offshore wind farm. *Biology Letters* 1, 296–298.
- Energyfarm Allt Domhain Ltd (2025). Allt Domhain Wind Farm. Environmental Impact Assessment Report, Volume 1, Chapter 8: Ornithology. June 2025.
- EU Case Law (2018). CJEU C-323/17 People Over Wind and Peter Sweetman vs Coillte Teoranta. Available online at: <http://curia.europa.eu/juris/document/document.jsf?text=&docid=200970&pageIndex=0&doclang=E&N&mode=lst&dir=&occ=first&part=1&cid=14842188> [Last accessed January 2026].
- Fox, A., Francis, I., Walsh, A., Norriss, D. & Kelly, S. (2021). Report of the 2020/2021 international census of Greenland White-fronted Geese by Greenland White-fronted Goose Study and National Parks and Wildlife Service. Available at: <https://greenlandwhitefront.org/wp-content/uploads/2023/12/arep2021-20211102WWT.pdf> [Last accessed March 2026].
- Fox, A., Francis, I., Walsh, A., Norriss, D. & Kelly, S. (2022). Report of the 2021/2022 international census of Greenland White-fronted Geese by Greenland White-fronted Goose Study and National Parks and Wildlife Service. Available at: <https://greenlandwhitefront.org/wp-content/uploads/2023/12/GWFG-Census-Report-2021-2022.pdf> [Last accessed March 2026].
- Fox, A., Francis, I., Walsh, A., Norriss, D. & Kelly, S. (2023). Report of the 2022/2023 international census of Greenland White-fronted Geese by Greenland White-fronted Goose Study and National Parks and Wildlife Service. Available at: <https://greenlandwhitefront.org/wp-content/uploads/2023/12/GWFG-Census-Report-2022-2023-Final.pdf> [Last accessed March 2026].
- Fox, A., Francis, I., Walsh, A., Norriss, D. & Kelly, S. (2024). Report of the 2023/2024 international census of Greenland White-fronted Geese by Greenland White-fronted Goose Study and National Parks and Wildlife Service. Available at: <https://greenlandwhitefront.org/wp-content/uploads/2026/01/GWFG-Census-Report-2023-2024-revised.pdf> [Last accessed March 2026].
- Fox, A., Francis, I., Walsh, A., Norriss, D. & Kelly, S. (2025). Report of the 2024/2025 international census of Greenland White-fronted Geese by Greenland White-fronted Goose Study and National Parks and Wildlife Service. Available at: <https://greenlandwhitefront.org/wp-content/uploads/2026/01/GWFG-Census-Report-2024-2025.pdf> [Last accessed March 2026].
- Fyne Futures Ltd. (2011). Auchadaduie Wind Turbines. Environmental Statement. December 2011.
- Gehring, J.L., Kerlinger, P.K. & Manville, A.M. II (2009). Communication towers, lights, and birds: successful methods of reducing the frequency of avian collisions. *Ecological Applications*, 19: 505–514.
- Gilbert, G., Gibbons, D.W. & Evans, J. (1998). *Bird Monitoring Methods: A Manual of Techniques for UK Key Species*. The Royal Society for the protection of Birds, Sandy, Bedfordshire, England.

Greenland White-fronted Goose Study. (n.d. a) 67 Rhunahaorine, Kintyre, Strathclyde Region – Status. [Webpage]. Available at: <https://greenlandwhitefront.org/gb-site-inventory/south-argyll/67-rhunahaorine-kintyre-strathclyde-region/> [Last accessed March 2026].

Greenland White-fronted Goose Study. (n.d. b) 68 Machrihanish, Kintyre, Strathclyde Region – Status. [Webpage]. Available at: <https://greenlandwhitefront.org/gb-site-inventory/south-argyll/68-machrihanish-kintyre-strathclyde-region/> [Last accessed March 2026].

Hill, D. (1992). The Impact of Noise and Artificial Light on Waterfowl Behaviour; A review and Synthesis of Available Literature.

Hüppop, O., Dierschke, J., Exo, K.M., Fredrich, E. & Hill, R. (2006). Bird migration studies and potential collision risk with offshore wind turbines. *Ibis* 148: 90–109.

Kerlinger, P. & Kerns, J. (2003). FAA lighting of wind turbines and bird collisions. Presentation at the NWCC Wildlife Working Group.

MacArthur Green for SSE (2018a). Tangy IV Wind Farm Environmental Impact Assessment Report, Volume 2: Main Report. Chapter 9: Ornithology. August 2018.

MacArthur Green for SSE (2018b). Tangy IV Wind Farm Environmental Impact Assessment Report, Volume 4: Appendices. Appendix 9.1: Ornithology. July 2018.

MacArthur Green for SSE (2018c). Tangy IV Wind Farm Environmental Impact Assessment Report, Volume 3a: Figures (Figures 9.1 – 9.27). August 2018.

NatureScot (2020). Information Note; The Effect of Aviation Obstruction Lighting on Birds at Wind Turbines, Communication Towers and Other Structures. Available at: <https://www.nature.scot/doc/information-note-effect-aviation-obstruction-lighting-birds-wind-turbines-communication-towers-and> [Last accessed April 2026].

NatureScot (2022). Disturbance distances in selected Scottish bird species.

NatureScot (2025a). Citation for Ramsar site (Kampala criteria, 2005) Kintyre Goose Roosts (UK13027) Available online at: <https://www.nature.scot/sites/default/files/ramsar-site/8431/ramsar-site-citation.pdf> [Last accessed March 2026]

NatureScot (2025b). Recommended bird survey methods to inform impact assessment of onshore windfarms.

NatureScot (2025c). Assessing impacts to pink-footed and greylag geese from small-scale wind farms in Scotland.

NatureScot (2025d). Kintyre Goose Roosts SPA Features: <https://sitelink.nature.scot/site/8518#features> [Last accessed March 2026].

NatureScot (2025e). Habitats Regulations Appraisal (HRA): <https://www.nature.scot/professional-advice/planning-and-development/environmental-assessment/habitats-regulations-appraisal-hra> [Last accessed January 2026].

NatureScot (n.d.). Conservation Objectives for Kintyre Goose Roosts Special Protection Area. Available online at: <https://www.nature.scot/sites/default/files/special-protection-area/8518/conservation-objectives.pdf> [Last accessed March 2026].

Plonczkier, P. and Simms, I.C. (2012). Radar monitoring of migrating pink-footed geese: behavioural responses to offshore wind farm development. *Journal of Applied Ecology* 49, 1187–1194.

Ramboll for ESB Asset Development UK Limited (2024). West Torrisdale Wind Farm. Environmental Impact Assessment Report, Volume 2: Main Report. Chapter 7: Ornithology. November 2024.

RES (2014). Blary Hill Wind Farm. Environmental Statement. December 2014.

RES (2024). Blary Hill Wind Farm (Post-construction Phase Year 3): Greenland White-fronted Goose Monitoring 2023-24. June 2024.

Schindler, A.R., Fox, A.D., Wikle, C.K., Ballard, B.M., Walsh, A.J., Kelly, S.B.A. & Weegman, M. (2024). Differential responses to weather and land-cover conditions explain spatial variation in winter abundance trends in a migratory bird of conservation concern. *Journal of Applied Ecology* doi.org/10.1111/1365-2664.14804.

Scottish Ministers (2019). Conservation of Habitats and Species Regulations 2017. Assessment of the implications of the proposed Tangy IV Wind Farm development for the Kintyre Goose Roosts Special Protection Area (SPA) in view of the conservation objectives of the SPA. October 2019.

Scottish Government (2023). National Planning Framework 4. Available online at: <https://www.gov.scot/publications/national-planning-framework-4/> [Last accessed January 2026].

Scottish Natural Heritage (1998). Citation for Special Protection Area (SPA) Kintyre Goose Roosts, Strathclyde (307A). Available online at: <https://www.nature.scot/sites/default/files/special-protection-area/8518/spa-citation.pdf> [Last accessed March 2026]

Scottish Natural Heritage (2011). Kintyre Goose Lochs Site of Special Scientific Interest Site Management Statement. Site code: 1680. Available at: <https://www.nature.scot/sites/default/files/site-special-scientific-interest/1680/site-management-statement.pdf> [Last accessed March 2026]

Scottish Natural Heritage (2016). *Assessing Connectivity with Special Protection Areas (SPAs)*. Version 3.

Scottish Natural Heritage (n.d.). Tangy Loch Site of Special Scientific Interest Site Management Statement. Site code: 1518. Available at: <https://www.nature.scot/sites/default/files/site-special-scientific-interest/1518/site-management-statement.pdf> [Last accessed March 2026]

ScottishPower Renewables (2013). Beinn an Tuirc Windfarm Phase 3. October 2015.

SSEN (2025). Tangy IV Wind Farm and Cnoc Buidhe Wind Farm 132 kV OHL Shared Use Connection. Environmental Impact Assessment: Scoping Report. March 2025. Available at: <https://www.energyconsents.scot/ApplicationDetails.aspx?cr=ECU00006122>

Therkildsen, O.R., Balsby, T.J.S., Kjeldsen, J.P., Nielsen, R.D., Bladt, J. and Fox, A.D. (2021). Changes in flight paths of large-bodied birds after construction of large terrestrial wind turbines. *Journal of Environmental Management* 290, 112647.

Trinder, M.N. 2015. Population modelling of Greenland white-fronted geese: potential impacts of additional mortality on the Scottish population and the Caithness and Kintyre subpopulations. Scottish Natural Heritage Commissioned Report No. 632.