

CLASHINDARROCH II WIND FARM

HRA Report

Prepared for: Vattenfall Wind Power Ltd

Technical Appendix 8.3

Technical Appendix 8.3
SLR Ref: 405.03640.00011
November 2019





Clashindarroch II Wind Farm EIA Report

Chapter 8 Technical Appendix:

8.3 Report to Inform a Habitats Regulations Appraisal for the Tips of Corsemaul and Tom Mor SPA

November 2019

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1. INTRODUCTION

1.1 Purpose of this Document

- 1.1.1 This is a technical appendix to Chapter 8 (Ornithology) of the Clashindarroch II wind farm (the 'proposed development') EIA Report. It collates and summarises relevant information to assist the competent authority in its determination of the potential effects of the proposed development on the Tips of Corsemaul and Tom Mor (SPA).
- 1.1.2 This is not a 'standalone' document as it refers to text and figures associated with Chapter 8 of the EIA Report.

1.2 Consultation & Scoping

- 1.2.1 Initial consultation with Scottish Natural Heritage (SNH) on the proposed development was undertaken prior to formal Scoping, in April 2016, with respect to confirming the key ornithological receptors for the proposed development and the proposed approach to the baseline surveys.
- 1.2.2 A scoping report, outlining the proposals and which included details of the proposed scope of, and methodological approach to, the assessment of effects on ornithological receptors, was issued for consultation in April 2017. A formal Scoping Opinion was provided by the Scottish Ministers in July 2017. Due to changes in the proposed wind turbine tip heights an updated scoping process was undertaken during 2018.
- 1.2.3 Consultation was undertaken with SNH during March 2017 and in April 2018, to discuss the potential implications of the proposals for the Tips of Corsemaul and Tom Mor SPA and to confirm that SNH were satisfied that there was sufficient baseline ornithological data available to inform the required assessment.
- 1.2.4 Responses to the 2018 scoping report were received from consultees in October and November 2018. The full list of consultees along with a summary of the consultation responses received is provided in Chapter 6: Scoping and Consultation.
- 1.2.5 In their scoping response SNH provided the following advice:

“Common gull/SPA - The proposed development site is within the foraging range of common gull from the Tips of Corsemaul and Tom Mor SPA. It is emphasised that the developer will provide a study of the impacts of the proposed development on the SPA, to inform the appropriate assessment. It is also advised that there is connectivity with the SPA and the legislative requirements for European sites.

Consideration of the increased turbine blade length will need to be made in relation to bird collision risk.

Aviation lighting will also need to be considered in relation to potential increased risk to birds from collision with the wind turbines”.

1.3 Tips of Corsemaul and Tom Mor SPA / SSSI

Brief Description of the SPA

- 1.3.1 The Tips of Corsemaul and Tom Mor is c. 84 hectares in area and is comprised of two hill-top moorland sites, adjacent to each other, located approximately 10km west of Huntly close to the boundary between Moray and Aberdeenshire. The boundary of the SPA is shown on Figure 9.2 (Ecology Chapter). The Tips of Corsemaul is part of a ridge between Corsemaul and Glenmarkie and rises to an elevation of 408m. Tom Mor, approximately 1km to the south-east of Tips of Corsemaul is a more rounded hill, which rises to an elevation of 370m. The habitats on the site are comprised of short grassland and heather moorland subject to muirburn and grazing, which at times has been controlled under a SNH agreed management plan.
- 1.3.2 The closest part of the SPA is approximately 6km north-west of the nearest proposed wind turbine. The boundary of the SPA is coincident with that of the Tips of Corsemaul and Tom Mor SSSI (Site of Special Scientific Interest).
- 1.3.3 The Tips of Corsemaul and Tom Mor qualifies for SPA designation under Article 4.2 of the Birds Directive¹ by supporting a breeding population of European importance of the regularly occurring migratory species common gull (*Larus canus*). The colonies that breed on these hill tops are exceptional for their size. The SPA citation, dated November 2000, states that these colonies comprised an estimated population of 15,870 pairs of common gull in 1998. At that time this represented 23% of Great British, 3% of Western and Central Europe and 3% of the World population of the species.
- 1.3.4 Since at least 2003 the colonies have been in decline. Current estimates (2015) of the number of fully formed nests indicate a reduction of c. 78% on the 1998 baseline. Further information, and discussion of the current status of the SPA population, is provided in Section 1.6.

1.4 Potential Impacts

- 1.4.1 The range of potential impacts of the proposed development on common gull are summarised as follows:
- Direct loss of habitat – the loss of breeding, foraging, roosting habitats from the constructed ‘footprint’ of the development. In this case no direct loss of any suitable habitats supporting the population is possible.
 - Indirect habitat loss – resulting from disturbance and displacement, birds avoiding individual wind turbines and the wind farm as a whole. In this case there is no potential for any loss of suitable habitat supporting the population.
 - Collision mortality – the proposed wind farm could result in direct mortality of common gulls associated with the SPA population when they fly through the wind turbine airspace. This risk could potentially be exacerbated by the presence of aircraft warning lights on the turbine towers and nacelles. Breeding adults lost to the population from collision mortality could also result in the loss of any unfledged young that season.

¹ Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (codified version of Directive 79/409/EEC) known as the Birds Directive.

- **Barrier to movement** – the presence of the wind farm could adversely affect common gulls by forcing birds to avoid around the wind farm (in combination with the existing wind turbines) resulting in increased energetic costs from the additional time spent flying. If the energetic costs can't be offset through food intake or use of alternative foraging habitats then this could result in an effect on breeding productivity of the SPA population.

2. BACKGROUND & METHODS

1.1 Relevant Legislation

- 2.1.1 The Birds Directive places great emphasis on the protection of habitats for endangered and migratory species. It requires signatory states to establish a network of Special Protection Areas for the most important sites for these species. Since 1994, all SPAs are included in the Natura 2000 network, established under the Habitats Directive². The Habitats Directive, as transposed into UK domestic legislation, imposes strict legal protections for all Natura sites.
- 2.1.2 The procedure for considering the potential effects of a proposed development on a Natura site differs from the environmental impact assessment (EIA) process as it is governed by separate legislation (i.e. the Habitats Regulations³ in the UK). Some plans or projects that have the potential to affect a Natura site may not require an EIA but will still need to be considered under the Habitats Regulations.
- 2.1.3 The Habitats Regulations impose specific and strict legal 'tests' that must be met before plans or projects, not directly connected with or necessary to the management of a site, can be approved by the competent authority (in this case Scottish Ministers).
- 2.1.4 The competent authority must determine whether the plan or project is likely to have a significant effect on the site. If the plan or project is deemed to have a likely significant effect (LSE), either individually or in combination with other plans or projects, it will be subject to 'appropriate assessment'.
- 2.1.5 The competent authority may only agree to the proposals after having ascertained that they will not, in combination with other plans or projects, adversely affect the integrity of the site in view of its qualifying interests (i.e. the reasons for which the site was classified or designated) and its conservation objectives (i.e. the specification of the overall target for the species and/or habitat types for which a site is designated in order for it to contribute to maintaining or reaching favourable conservation status). The competent authority may also take into consideration, in its determining the effect on the site's integrity, any mitigation that is proposed to avoid or minimise impacts on the site's qualifying interests. This process as a whole is also referred to as Habitats Regulations Appraisal (HRA).

² Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, known as the Habitats Directive.

³ In Scotland the EC Habitats Directive is transposed into domestic law through a combination of the Habitats Regulations 2010 (in relation to reserved matters) and the Conservation (Natural Habitats &c.) Regulations 1994.

- 2.1.6 In Scotland, the competent authority must consult Scottish Natural Heritage, as the Statutory Nature Conservation Organisation, for advice during the HRA process prior to making their determination.
- 2.1.7 The Tips of Corsemaul and Tom Mor are also designated as a SSSI with the sole notified feature being the breeding common gull colonies. The boundaries of the SPA and SSSI designations are the same. SSSIs are designated and protected under separate legislation to SPAs, and there is a separate process for consenting or refusing operations that could have a detrimental effect on the SSSI qualifying features. This legislation normally applies to land management activities that could have direct impact on the site. The proposed development will not have any direct effects on a SSSI, being located 6km from the development. Therefore the SSSI designation and associated legal framework are not considered further in this report.

2.2 HRA Guidance & Approach

- 2.2.1 The following list some of the key guidance on the HRA process that has been considered in preparing this appendix:
- European Communities (2000). Managing Natura 2000 sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/CEE.
 - European Union (2011). EU Guidance on wind energy development and Natura 2000.
 - Scottish Government (2013). Planning Series Circular 6/2013: Development Planning.
 - Scottish Government (2014). Scottish Planning Policy (2014), paragraphs 207 to 211.
 - SNH (2014). Natura Casework Guidance: How to consider plans and projects affecting Special Areas of Conservation and Special Protection Areas. Version 9.0, February 2014.
- 2.2.2 Exactly what comprises an appropriate assessment is not defined in law as requirements will vary on a case-by-case basis (i.e. in relation to the ecology of the protected species and habitats potentially affected and the scope and scale of potential effects that could arise from the proposal under consideration). In essence, appropriate assessment is an evidence-based appraisal of the effects of the proposals on the relevant qualifying interests of the designated site.
- 2.2.3 SNH has advised, through the EIA scoping process, that the proposed development should be considered to have a 'likely significant effect' on the Tips of Corsemaul and Tom Mor SPA. Therefore, before granting consent the competent authority must determine, beyond reasonable scientific doubt, whether the proposals would result in an adverse effect on the site's 'integrity'. Site integrity is typically defined as the coherence of its ecological structure and function, across its whole area, which enables it to sustain the habitat, complex of habitats and/or the levels of populations for which it was classified.

- 2.2.4 The HRA process, for a plan or project that is not directly connected with or necessary to a site's management for nature conservation, can be summarised as a series of steps, as follows⁴:
- Step 1: Determine if the plan or project (either alone, or in combination with other plans or projects) likely to have a significant effect on the site.
- 2.2.5 This determination is made by the competent authority (with guidance, as required, from SNH). The decision is framed by the 'precautionary principle' such that where there is uncertainty and a significant effect cannot reasonably be ruled out then an appropriate assessment is required.
- Step 2: Undertake an appropriate assessment of the implications for the site in view of its conservation objectives.
- 2.2.6 The key considerations for the appropriate assessment are to:
- Describe for each qualifying interest the potential impacts of the proposal detailing which aspects or effects of the proposal could impact them and their conservation objectives.
 - Evaluate the potential impacts, e.g. whether short/long term, reversible or irreversible, and in relation to the proportion/importance of the interest affected, and the overall effect on the site's conservation objectives, taking into account any possible 'in combination' effects with other plans or projects.
 - Each conservation objective should be considered and a decision reached as to whether the proposal will affect achievement of this objective i.e. whether the conservation objective will still be met if the proposal is consented to.
- 2.2.7 If it can be ascertained, beyond reasonable scientific doubt, that the proposal, taking into account any proposed mitigation, will not adversely affect the integrity of the site then it may be consented to.
- Step 3: If an adverse effect on site integrity is concluded⁵ then there is a requirement to consider alternative solutions which would avoid the effect.
 - Step 4: Where there are no satisfactory alternative solutions a project can only proceed where there imperative reasons of overriding public interest.
- 2.2.8 Where a plan or project must be carried out (in the absence of alternative solutions) and for imperative reasons of over-riding public interest, appropriate compensatory measures must be taken to ensure the maintenance of the coherence of the Natura network. Compensatory measures are distinct from mitigation proposed to address the effects of the proposal. They are normally undertaken outside of the designated site affected (e.g. the creation of habitat to compensate for what has been lost / adversely affected). Such measures have to be in place (e.g. the habitat has to have been created and be of sufficient extent and quality) before the development proceeds.

⁴ This text is summarised from SNH guidance (2014): Natura Casework Guidance.

⁵ Or if, in relation to the 'precautionary principle', it has not been possible to ascertain that the proposal will not adversely affect the integrity of the site.

Tips of Corsemaul and Tom Mor SPA Conservation Objectives

2.2.9 The Conservation Objectives for the Tips of Corsemaul and Tom Mor SPA are defined as follows:

- to avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and
- 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 the site;
 - distribution and extent of habitats supporting the species;
 - structure, function and supporting processes of habitats supporting the species; and
 - no significant disturbance of the species.

2.2.10 The meaning of 'viable component' in this context is in its broadest sense, i.e. beyond simply avoiding local extinction of the population. It relates to the maintenance of the population at a favourable conservation status, which is a specific requirement of member states in the protection and management of their Natura network.

2.2.11 As previously stated, 'integrity' is typically defined as the coherence of the ecological structure and function of a site, across its whole area, which enables it to sustain the habitat, complex of habitats and/or the levels of populations for which it was classified.

3. SUMMARY OF AVAILABLE DATA

3.1 SPA / SSSI Information

3.1.1 Information related to the SPA designation has been obtained from publically available sources such as the Sitelink website [<https://sitelink.nature.scot>].

3.1.2 SNH also provided information from the site condition monitoring studies of the Tips of Corsemaul and Tom Mor SSSI completed between 2003 and 2015.

3.2 Scientific Literature

3.2.1 Various published peer-reviewed scientific papers, SNH research reports, and other relevant literature were reviewed to provide the information required to inform the assessment.

3.3 In-Combination Assessment

3.3.1 The assessment of potential 'in-combination' effects on the SPA population has been informed by a review of available information on consented and proposed wind farms in the region.

3.3.2 Maps showing the location of wind farm developments (existing and proposed) within the study area were derived from datasets provided on the SNH Natural Spaces website

[<https://gateway.snh.gov.uk/natural-spaces/>]. The 'Onshore Wind Farm Proposals' dataset was downloaded (version dated 5th July 2019).

- 3.3.3 Information on the potential effects of these projects on common gull has been obtained from various Environmental Statements / EIA Reports downloaded from online sources including local authority planning portal websites, the Scottish Government Energy Consents Unit website [<https://www.energyconsents.scot>] and the Scottish Government Planning and Environmental Appeals Division (DPEA) website [<https://www.dpea.scotland.gov.uk>].

3.4 Clashindarroch Wind Farm EIA Surveys

- 3.4.1 The baseline flight activity surveys for the Clashindarroch wind farm EIA were undertaken in 2004, 2005 and 2008 (full details are provided in the 2009 Environmental Statement). The proposals, at that time, were for a much larger wind farm development than was eventually consented. These surveys included the Clashindarroch II area (see 2009 ES Figure 11.3 provided in Appendix 8.3.1). Focal surveys on common gull flight activity during the breeding season, specifically in relation to determining the potential effects of the wind farm proposal on the Tips of Corsemaul and Tom Mor SPA, were also completed in 2004, 2005 and 2008.

2004

- 3.4.2 During 2004 flight activity surveys for common gull (and other target species) were completed between March and August. Additional vantage points were established to monitor common gull activity in relation to movements to or from the direction of the Tips of Corsemaul and Tom Mor SPA. During August 2004 nocturnal watches were also carried out to determine if there was any common gull activity over the site at night.
- 3.4.3 Data from the 2004 surveys indicated that the majority of gull flights were consistent with the birds coming to and from the Tips of Corsemaul Tom Mor SPA. The highest levels of activity were recorded between March to June inclusive, with activity tailing off on the study site in July and August. A considerable amount of common gull activity was recorded from VP watches but there were very few recorded flights over the proposed wind farm area. The vast majority of flights activity was recorded well to the north between Craigend Hill and north of the Brown Hill/Muckle Long Hill ridge. There was a distinct east/west direction to the vast majority of the flights, although many gulls were also observed feeding to the west of the study site along the River Deveron valley.

2005

- 3.4.4 During 2005 flight activity surveys were completed between February and August. In addition, the distribution of feeding common gulls in the local area was recorded. Further flight activity surveys, also focused on recording common gull, were completed between March and August 2008. As with the previous surveys, common gull activity was recorded almost entirely at the northern end of the study area, consistent with the flight corridor identified in 2004. Collision risk modelling undertaken at that time, applied to the original wind farm layout which includes much of the area of Clashindarroch II wind farm, predicted 3-9 common gull collisions per year, based on avoidance rates of between 98% and 95%.

- 3.4.5 Use of the site and surrounding area by foraging and roosting gulls was also surveyed. Feeding activity was recorded primarily on the A920 corridor between Huntly and west to beyond the Tips of Corsemaul and Tom Mor SPA. Further high levels of activity were recorded along the River Deveron valley, west of the proposed wind farm site, with flocks of over 100 recorded on several occasions. The birds flying over the survey area appeared to be heading for feeding grounds in the River Bogie valley area and in particular near Bogandry, Tillathrowie and West Tillathrowie. Generally feeding flocks recorded were small and numbered 50 or less.

2008

- 3.4.6 Further flight activity surveys were completed between April and July 2008. The distribution of common gull flights was again similar to previous survey years, with the majority at the northern end of the study area, to and from Brown Hill and Tillathrowie/Wester Tillathrowie via Muckle Long Hill. Flight activity was more intense around dusk than dawn. Nocturnal flight activity in the survey area was very low, with only three events recorded.
- 3.4.7 A relatively small number of birds were observed in flight within the proposed wind farm area (i.e. Clashindarroch wind farm), a total of 33 or c. 0.7% of the total recorded. The collision risk model based on these data predicted collision rates ranging from one every 7.5 months (95 % avoidance) to one every 3.1 years (99 % avoidance).
- 3.4.8 Surveys of common gull foraging and roosting again confirmed that activity was distributed widely across Strathbogie, with particularly high concentrations of flocks in pastures close to the SPA along the A920. Common gull were also recorded in significant numbers along the A97 down to Rhynie, and along as far as Mains of Lesmoir. Numbers were comparatively low to the south and south-west of the site.
- 3.4.9 All of these surveys demonstrated that flight activity within the wind farm study area (which at that time included the Clashindarroch II area) was infrequent and considerably lower than a clear movement corridor recorded to the north (see the 2009 ES Figure 11.10 included in Appendix 8.3.1). The results of the flight activity and feeding distribution surveys indicated that SPA birds may very occasionally traverse the wind farm in order to reach farmland to the south-east of the site. However, a specific assessment of the potential effects of the Clashindarroch wind farm project on the SPA concluded that there would be no adverse effect on the SPA.

Clashindarroch II Wind Farm Baseline Surveys

- 3.4.10 During 2015 to 2017 bird flight activity data was collected from strategically located VPs following the methods described in Chapter 8. Flight activity data was collected during timed watches (normally 3 hours long) from May 2015 to August 2016. Due to the findings from the previous survey indicating that the area was unlikely to be used or overflowed by common gull this species was not treated as a target species but the presence of birds in flight within the survey area was recorded.
- 3.4.11 Following the scoping process it was agreed with SNH that during the April to August 2017 flight activity survey common gull would be treated as a target species (with all flight activity recorded in detail) and an additional VP would be established to specifically monitor common gull flight activity in a wider area to the north of the proposed wind farm (see Figure 8.2).

- 3.4.12 The results of the flight activity survey are provided in full within Technical Appendix 8.1. The collision risk modelling results for common gull are provided in Technical Appendix 8.2. In summary, a similar pattern of flight activity to that which was recorded in 2004, 2005 and 2008 was found. Although the overall frequency of flights was apparently lower, most likely reflecting the reduction in the size of the breeding colony since 2008. There was an apparent preferred flight corridor well to the north of the proposed wind farm, associated with the Craigs of Succoth and Muckle Long Hill, over 2km from the northernmost proposed wind turbine.
- 3.4.13 Collision risk modelling of the 2017 data resulted in a predicted annual collision rate for common gull of 0.005, equating to one collision every c. 200 years.

Details of the Proposed Development

- 3.4.14 The proposed development is fully described in Chapter 3 (Description of the Proposed Development) with the key components shown on Figure 3.1.
- 3.4.15 The proposed development involves the construction of 14 wind turbines and their associated access tracks (c. 11 km of new and some limited upgrading of existing forestry tracks), a permanent meteorological mast, establishment of temporary and permanent compounds and the extraction of stone from the extension to an existing borrow-pit within the site. The turbine blades are 70 m long and the turbine hub height would be 110 m above ground level. The pre-works felling, site clearance and construction works are anticipated to take 18 months in total (further detail on the wind farm design, construction plans and programme is provided in Chapter 3).
- 3.4.16 Prior to construction works commencing, areas of existing conifer plantation would be felled to accommodate the works. The total felling required (which would be felled early in comparison to the baseline felling date) is estimated to be 125 hectares. Following construction, conifers would be replanted, at typical plantation densities, to within c. 80 m of the wind turbine bases (further detail on the wind farm felling and replanting plans is provided in the Forestry Technical Appendix 3.2).
- 3.4.17 Two types of aircraft warning lighting are required to be fitted to the highest practical points on the wind turbines (i.e. on the nacelle). The turbines on the perimeter of the scheme are to be fitted with MOD accredited 25 candela omni-directional red or infrared lighting with an optimised flash pattern of 60 flashes per minute. All of the wind turbine nacelles will also be fitted with medium intensity (2000 candela) steady red aviation warning lights to comply with CAA requirements.

3.5 Common Gull Breeding Ecology and Population Status

Summary of Breeding & Foraging Ecology

- 3.5.1 Common gull breeds both inland and at coastal sites. Approximately half of the Scottish breeding population nest at inland sites, typically in colonies of various sizes at favoured locations that are used for many decades. These sites can be associated with inland waterbodies, moorland and shingle banks on rivers. Large inland colonies in north-east Scotland are typically on suitable hilltops and ridges with heather and grass located near to lowland river valleys and open agricultural land that provides a good source of food.

- 3.5.2 Common gulls can return to breeding sites in February but, typically, numbers start to build in April. Egg-laying and incubation (22 to 28 days) occurs between May and June, hatching in late May to late June. Fledging occurs approximately 35 days after hatching (BTO Nest Record Scheme, Robinson 2005). Birds tend to leave the colony sites when the chicks have fledged.
- 3.5.3 There is limited information available on common gull breeding and survival rates. Adult survivorship is given as 0.80 in Garthe and Hüppop (2004), which is based estimates from a study in Germany. The typical lifespan is 10 years with age at first breeding occurring in the third year (Coulson 2019). The number birds fledged per pair has been reported for 12 primarily coastal or island colonies in the UK (Mavor *et al.* 2006). Breeding productivity has also been studied at colonies on the west coast of Scotland between 1991 and 1997 (Craik 1999, 2000). The number of fledged chicks per breeding pair ranged from 0.4 to 0.6, with a higher rate for pairs nesting early in the season. Predation from herring gull, peregrine and mink can have a large effect on colony breeding success and can result in whole-colony breeding failure.
- 3.5.4 The common gull foraging ecology is highly adaptable, their diet can be varied and depends on the habitats being exploited (Götmark, 1984, Kubetzki *et al.* 1999). During the breeding season food items from agricultural land include insects, earthworms and grain. Playing fields care also exploited for earthworms. Small fish and aquatic invertebrates are taken from rivers and lochs and crustaceans from intertidal habitats. For upland colonies (such as Tips of Corsemaul and Tom Mor) moorland habitats can also be important as a source of food during the breeding season, when insects like the northern eggar (*Lasiocampa quercus*) and crane flies (Tipulidae) can form an important part of the diet. Common gulls have also been recorded feeding on fruits of crowberry (*Empetrum nigrum*) and blaeberry (*Vaccinium myrtillus*) in August and September (Vernon 1972).
- 3.5.5 Common gulls may also be active at night, particularly at coastal sites, in the winter, or generally when there is a low food availability. However, the evidence from the 2008 surveys indicates that nocturnal activity that could be relevant to this assessment is unlikely to take place on a regular basis and at a much lower level than daytime and crepuscular periods.
- 3.5.6 The ranging behaviour of inland colonies of common gull has been poorly studied in the UK. Maximum foraging radius of breeding gulls were reported at 40 km for one common gull colony in the Baltic Sea. Thaxter *et al.* (2012) report a maximum foraging range of 50km and a mean of 25km.

Global, European and UK Status

- 3.5.7 The common gull is widely distributed in the northern hemisphere with the breeding range extending across Iceland, northern Europe, northern Asia, Alaska and western Canada. The global population size is unknown but has been estimated at between 800,000 and 1.25 million adults (Coulson 2019). The IUCN assessed status of the global population is 'least concern'.
- 3.5.8 The European breeding population has been estimated at 640,000-1,080,000 pairs (BirdLife International 2017). Common gull is listed on Annex II (part B) of the Birds

Directive and Annex II of the Agreement on the Conservation of African-Eurasian Migratory Waterbirds⁶.

- 3.5.9 The size of the UK population is uncertain, due to a lack of comprehensive single-year censuses, but has been estimated at 48,000 pairs (Mitchell *et al.* 2004). A much larger number of common gulls winter in the UK, estimated at over 700,000 individuals (Banks *et al.* 2007). In the UK most common gulls breed in Scotland but they are more widely distributed during winter. The common gull is currently on the UK Amber list of Birds of Conservation Concern (Eaton *et al.* 2015). This is due to recent breeding and winter population declines as well as reductions in the breeding and wintering range in the UK.

Status of the SPA/SSSI Population

- 3.5.10 The current condition of the SPA has been assessed as 'unfavourable declining' (2015). The results of recent surveys (in 2003 and 2015) indicate that the colonies have declined markedly since the original baseline surveys were carried out in 1998 when 13,784 fully formed nests were recorded.
- 3.5.11 Aerial surveys completed in 2003 estimated that the colonies contained 6,565 fully formed nests in total. This is approximately 48% of the 1998 baseline (i.e. a c. 52% decline).
- 3.5.12 Line transect surveys carried out in 2007-08 estimated 6,220 fully formed nests within the SPA/SSSI as a whole. With an increase to Tom Mor colony and a decrease to the Corsemaul colony. There was also a small satellite colony located to the south-west with a total of 456 pairs estimated. The Tom Mor colony (4,156 fully formed nests in 2007) appeared to be stable and there was a 73% hatching success and between 1,500 to 2,000 young fledged in 2008. The Tips of Corsemaul colony (2,064 fully formed nests in 2008), had a much lower hatching success (33%) and under 200 young fledged in 2008.
- 3.5.13 Poor hatching success was noted during the 2007-08 surveys. The cause were unclear but there was evidence of predation by magpie (*Pica pica*) and common gull had previously been recorded on Corsemaul and high levels of localised egg predation, probably by common gull, were also suspected on Tom Mor. There was no evidence at the time of high levels of mammalian predation. A higher than normal incidence of dead or dying birds was seen in the Corsemaul colony in 2007-8 but no evidence of deliberate or accidental poisoning was found. Poor weather during the incubation / young chick period has also been suggested as a cause of breeding failure.
- 3.5.14 A line transect survey of the colonies was repeated in 2015. Using distance sampling and statistical analysis of the fieldwork results the number of fully formed nests was estimated as 2,596 for Tom Mor and only 436 at Corsemaul, giving a total of 3,032. The total figure for fully formed nests is a reduction of 78% on the 1998 baseline and is 51% lower than the 2007-08 estimate.
- 3.5.15 The periodic decline and abandonment of common gull colonies and the establishment of new breeding locations has been reported from a number of sites in north-east Scotland. In recent years, during the declines recorded at the Tips of Corsemaul and

⁶ The Agreement on the Conservation of African-Eurasian Migratory Waterbirds, or African-Eurasian Waterbird Agreement is an independent international treaty developed under the auspices of the United Nations Environment Programme's Convention on Migratory Species (Bonn Convention), which was adopted in September 2008.

Tom Mor, common gull colonies have increased greatly in size in the wider region (e.g. at Bluemills, Lecht area and near Corgarff). Unlike the case study from the west coast where mink predation was a clearly a key factor, in the north-east colonies it has been difficult to determine the causes of these declines but a number of theories have been put forward.

- 3.5.16 The common gull colony at the Correen Hills (c. 11km south-east of the Clashindarroch II wind farm site) once supported a nationally important population but numbers declined markedly in the mid-1990's and it is currently abandoned (2015). A 1995 survey reported that numbers of 'active nests' (equivalent to breeding pairs) were approximately 80% of the 1988-89 census. The decrease was assumed to be partially accounted for by the expansion of other colonies in the region (including the colonies at Tom Mor and Tips of Corsemaul). There was also evidence of reduced breeding success at the site in 1995, possibly linked to predator disturbance. A survey in 1998 survey showed that the colony had declined further with no breeding success recorded (SNH Correen Hills SSSI Management Statement, 1996).
- 3.5.17 As well as predation, other factors that may influence colony decline include changes to land management and land use (e.g. changes in grazing intensity and timing, muirburn regime, establishment of new forestry), weather and climate, parasite load and disease, harvesting of eggs by people. It is likely that a combination of these factors can result in poor breeding conditions in some years, resulting whole colony breeding failure, which if this occurs repeatedly could result in site abandonment.

Future Trends

- 3.5.18 Given the recent history in north-west Scotland of common gull breeding colony increases, decreases, abandonment of sites and the establishment of new ones, it is very difficult to predict how the baseline situation could change during the lifetime of the proposed wind farm (assumed to be 25 years). In terms of the SPA colonies, there has been a trend for smaller satellite colonies to be establish at sites near to the SPA. However, it appears that the preferred agricultural foraging habitats have remained relatively stable and are unlikely to change. It is possible, should a large colony establish closer to the proposed wind farm, that flight activity could increase marginally, resulting in a higher collision mortality rate that what has been predicted from the baseline surveys to date. However, the habitats within the site are not attractive to foraging or roosting gulls and this situation is very unlikely to change during the lifetime of the wind farm. Additionally, common gull commuting activity is driven by the distribution of preferred agricultural foraging habitats. These areas are defined by land-use but are topographically located with lowland river valleys to the north of the proposed wind farm.
- 3.5.19 In conclusion, it is considered improbable that flights through the wind farm area could ever increase from current levels to a point where there would be a biologically meaningful impact on the SPA population.

4. ASSESSMENT

4.1 SPA Connectivity

- 4.1.1 SNH have produced species-specific guidance to inform decisions on HRA screening for projects that have the potential to affect SPA populations ranging outside of the

protected site⁷. However, common gull is not included in the current guidance. There is generally a lack of published research on the ranging behaviour of common gulls during the breeding season. Thaxter *et al.* (2012), in a literature review of seabird ranging behaviour studies, reported a maximum foraging range of 50km and a mean of 25km for common gull. It should be noted that the focus of that study was to help identify marine areas, away from breeding colonies, that may be critical in supporting seabird populations.

- 4.1.2 The proposed development is located c. 6km from the Tips of Corsemaul and Tom Mor SPA. There is no potential for the proposed development to result in any direct effects on the SPA site. However, assuming a 25km mean ranging distance is applicable to the SPA colonies, there is the potential for the proposed development to adversely affect common gulls on foraging trips to and from the colony site to habitats in the wider surrounding area.
- 4.1.3 In this assessment it has been conservatively assumed that all common gull activity recorded near to the proposed wind farm are birds associated with the Tips of Corsemaul and Tom Mor SPA population.

4.2 Potential Effects

- 4.2.1 In this assessment direct and indirect habitat loss impacts have not been considered further as there is no potential for LSE. The proposed wind farm is located 6km from the SPA and there is not suitable habitat for common gull within or immediately adjacent to the wind farm.
- 4.2.2 The focus of this assessment is on the potential for wind turbine collision mortality to affect the status of the SPA population and the extent to which the proposed wind farm could present a barrier to free movement for common gulls ranging to and from the SPA breeding colonies and suitable foraging habitats present in the wider area. Finally, consideration is also given to the potential for Clashindarroch II wind farm, in combination with other plans or projects, to result in cumulative effects on the SPA population.

Collision Risk

- 4.2.3 Common gulls have been recorded as collision victims at a number of wind farms in the UK and elsewhere in Europe (Hotker *et al.* 2006). However, most records relate to wind farms located along the coast or in lowland agricultural settings, with high daily transit rates, rather than upland sites far from the coast.
- 4.2.4 Garthe & Hüppop (2004) developed a wind farm sensitivity index for seabirds, primarily to help inform constraints for offshore wind farm development in German territorial waters of the North Sea. They considered various species attributes (both quantitative and qualitative) that could influence their sensitivity to wind farm development including: flight manoeuvrability; flight altitude; percentage of time flying; nocturnal flight activity; flexibility in habitat use; adult survival rate; and conservation status. Garthe & Hüppop (2004) reported an adult annual survival rate of 0.8 (from Glutz von Blotzheim & Bauer 1982). Each factor was scored on a 5-point scale from 1 (low vulnerability) to 5 (high

⁷ SNH (2016). Assessing connectivity with special protection areas. SNH Guidance, June 2016.

vulnerability). Of the 26 species considered in the study, common gull was ranked 21st in terms of overall sensitivity. The individual attribute rankings relevant to this assessment were as follows:

- Flight manoeuvrability = 1
- Flight altitude = 3
- Percentage of time flying = 2
- Nocturnal flight activity = 3
- Habitat use flexibility = 2
- Adult survival rate = 2

- 4.2.5 Dierschke *et al.* (2016) carried out an extensive meta-analysis of the extent to which seabirds are displaced from, or attracted to, offshore wind farms. They used data from post-construction monitoring studies of 20 wind farms in the Irish, North and Baltic seas. Several gull species, including common gull, were considered to show a weak attraction to offshore wind farms. Although it was speculated that in some cases this could relate to birds following survey vessels into the study areas. In any case, although this finding is not directly applicable to an onshore wind farm, it indicates that common gulls do not have an inherent tendency to avoid wind farms at the macro (or site) scale. Langston (2010) also assessed the sensitivity of common gull to the effects of offshore wind farms and concluded that this species has a comparatively low sensitivity.
- 4.2.6 The estimated annual collision rates, based on the various surveys completed to date for Clashindarroch and Clashindarroch II combined and using the currently recommended avoidance rate of 99.2% (Furness 2019), indicate a maximum of 0.33 birds per annum. Assuming that all of the collisions would affect breeding adults in the SPA population, this represents 0.005% of that population (i.e. based on the 3,032 estimated total number of fully formed nests in 2015). Applying an assumed annual adult survival rate of 0.8, this population would be expected to experience 1,213 adult deaths per year. In order for the predicted collision mortality to reach a nominal threshold of 1% of the baseline annual adult mortality the wind farm would need to remove 12 birds from the population per year (assuming all of the mortality is additive). A level of collision mortality is 36 times higher than the rate predicted. This is a rather simplistic analysis but gives a reasonable indication that the predicted collision rates would be highly unlikely to result in an effect on the population in terms of the existing annual survival rates and rates of breeding productivity.
- 4.2.7 As the SPA population is in decline, the theoretical threshold at which wind farm related mortality could become significant for the population could decrease. However this would be expected to be accompanied by a concurrent decrease in the rate at which birds are passing through the wind farm. Consequently, in the situation where the colony declines further it is unlikely that the wind farm collision rates would ever reach a level where they are contributing meaningfully to the continued decline of the population.
- 4.2.8 In conclusion, the risk of collision mortality from the wind farm having any effect on the SPA population, in terms of its key demographic metrics, is considered to be negligible based on the available data. The risk would have to increase by more than an order of magnitude for it to be potentially measurable in terms of the assumed adult annual survival rates.

4.2.9 The proposed aircraft warning lighting has the potential to influence the collision rates as common gulls are known to be occasionally active at night and have been recorded at night near to the wind farm, although at much lower rates than during the day / twilight hours. A more general discussion of this issue is provided in Chapter 8. In summary, the risk of increased mortality rates due to aircraft warning lighting is considered to be negligible for this species. This is due to the absence of evidence of a particular risk to gulls from lighting at upland wind farms (i.e. away from lowland agricultural areas and the coast) and the specific circumstances of the site, with respect to the low levels of flight activity recorded within or near to the proposed wind farm.

Displacement & Barrier Effects

4.2.10 There is the potential for the presence of the wind farm (as a whole) to displace common gull from important habitats supporting the SPA population. Additionally, the presence of the wind farm could force breeding gulls commuting to and from important foraging habitats in the wider area to make a diversion from their preferred, or most efficient, flight route. This could result in energetic costs that could theoretically affect survival and breeding success.

4.2.11 As discussed above, common gull as a species is not considered to be particularly sensitive to the presence of offshore wind farms and has shown a weak attraction to some sites. In relation to onshore wind farms, there is little information available in the literature, applicable to the proposed wind farm, which indicates this species is likely to avoid the wind farm area. There is also no evidence from the available survey data (i.e. surveys completed in 2004, 2005, 2008, 2015, 2016 or 2017) that the proposed wind farm site or adjacent areas (i.e. within 500m) provide any suitable habitat for common gull, in terms of foraging, breeding or roosting. Therefore the potential for displacement from the site to impact on the availability of habitats supporting the population is considered to be negligible.

4.2.12 In relation to the location of preferred foraging habitats, the distance of the proposed wind farm from the SPA, the ranging behaviour of the species and the available data indicating that preferred flight corridors are located more than 2km from the proposed wind farm, all strongly suggest that barrier effects are unlikely to occur. This effect is also considered to be negligible for the SPA population.

Summary Assessment Table

4.2.13 Table 1 below provides a summary the appraisal of the potential implications of the proposed development for the Tips of Corsemaul and Tom Mor SPA common gull population, in view of the sites' conservation objectives.

Table 1: Summary of the Assessment of the implications of the proposed development in relation to the SPA Conservation Objectives

Impacts	Effects	Conclusions
<i>Conservation Objective: To avoid deterioration of the habitats or significant disturbance...</i>		
Construction / decommissioning - habitat loss / degradation	The construction of the wind farm will have no direct effect on the SPA and will not affect any habitats that are suitable for common gull as a foraging resource, or for breeding or roosting.	No effect

Construction / decommissioning - disturbance	There is no risk of disturbance to the breeding colonies from the construction of the wind farm, this could have no direct effect on the SPA (6km to the north-west).	No effect
<i>Conservation Objective: To ensure the population as a viable component of the site...</i>		
Operational Collision Risk	The predicted collision mortality rates are well below any reasonable threshold of importance. There is no potential for any meaningful effect on the current survival rates for the SPA population. The aircraft warning lighting is not considered to appreciable increase the risk of collision for this species.	Negligible effect
<i>Conservation Objective: To ensure the distribution of the species within site...</i>		
Barrier to Movement	There is no consistent evidence from the literature that this species avoids wind farms as a whole. In relation to the location of preferred foraging habitats, distance of the proposed wind farm from the SPA, the size of the wind farm, distance from the main flight corridors used by the SPA population, and the ranging behaviour of the species, this effect is considered to be negligible.	Negligible effect
Displacement	There is no evidence from the survey data (i.e. surveys completed in 2004, 2005, 2008, 2015, 2016 or 2017) that the proposed wind farm site or adjacent areas (i.e. within 500m) provide any suitable habitat for common gull, in terms of foraging, breeding or roosting. Therefore no meaningful displacement effects are considered possible.	No effect
<i>Conservation Objective: To ensure the structure, function and supporting processes of habitats supporting the species</i>		
Long-term habitat effects	No effects on the structure, function and supporting processes of habitats supporting breeding common gull are possible.	No effect
<i>Conservation Objective: No significant disturbance of the species.</i>		
Long-term disturbance	The operating wind farm (including the potential for aircraft warning lighting) would have negligible potential to disturb the breeding colonies due to the 6km distance between the wind farm and the SPA.	Negligible effect

4.2.14 Careful consideration has been given to all of the potential direct and indirect effects of the Project on the Tips of Corsemaul and Tom Mor SPA common gull population. It has been concluded that there would be no potential for the proposed development to appreciably undermine the attainment or maintenance of any of the SPA conservation objectives for this species.

4.3 Other Plans or Projects

4.3.1 Cumulative (i.e. additive) collision mortality has been the primary concern in relation to the potential 'in combination' effects (e.g. biologically important levels of cumulative mortality arising in combination with other wind farm developments in the region). This issue is also discussed further within Chapter 8.

4.3.2 A review has been completed of all consented and proposed wind farm developments (i.e. those in planning with published impact assessments) within 25km of the Tips of Corsemaul and Tom Mor SPA. Table 2 below provides a summary of the information collated during this review.

Table 2: Summary Information from the Review of Wind Farms within 25km of the SPA

Site name	No. turbines	Dist. from Clash. II wind farm (km)	Direction from Clash. II wind farm	Dist. from SPA (km)	Status	Documents available
Aultmore	13	24.1	North	18.5	Consented	Environmental statement
Cairnmore Farm Extension	5	8.2	Southeast	4.9	Operational	Environmental report and associated planning documents
Clashindarroch	18	0.3	Southwest	6.8	Operational	Environmental report and associated planning documents
Dorenell	59	8.8	West	9.4	Under construction	Environmental statement and associated planning documents
Dummuie	7	10.9	Northeast	14.7	Operational	Planning documents
Edintore	6	12.3	North	6.2	Operational	Pre-application supporting information
Glens of Foudland	20	15.6	East	18.8	Operational	Environmental report and associated planning documents
Hill of Tillymorgan	3	19.4	East	22.9	Operational	Environmental report and associated planning documents
Hill of Towie	21	14.4	Northwest	6.7	Operational	<i>None available</i>
Hill of Towie 2	16	13.8	Northwest	5.8	Approved	Environmental report and associated planning documents
Kildrummy	8	10.3	South	17.1	Operational	Planning documents
Roths*	22	28.2	Northwest	22.3	Operational	<i>None available</i>
Roths II*	18	28.2	Northwest	22.3	Operational	<i>None available</i>
Roths III	29	23.8	Northwest	18.2	status unknown*	Environmental report and associated planning documents

*Roths and Roths II occupy the same area on the map (only Roths is labelled).

- 4.3.3 Details of the reported status and significance of impacts for common gull for each site are included in Table 2. None of the above published assessments report significant residual effects for any receptor at a scale greater than local population level.
- 4.3.4 For common gull, where this species is mentioned in the available documents, they are reported as present in very low numbers and the assessments conclude that there would be a very low or negligible impact on common gull populations associated with the SPA.
- 4.3.5 Common gulls were recorded within the proposed site at Cairnmore. Activity was concentrated in a northern area of the site between Craigend Hill and Brown Hill. The observed activity indicated that gulls were commuting to and from the Tips of Corsemal and Tom Mor SPA, but were not using commuting routes across the site. The overall risk of disturbance or displacement was therefore assessed as low and the overall impact not significant. The collision risk assessment for Cairnmore estimated an annual collision

risk for common gull of 0.079 birds, representing less than two collisions for the 25 year life span of the wind farm. This was considered to represent a negligible impact on the common gull population.

Table 2: Summary Common Gull information

Site	Summary of Common Gull Assessment
Aultmore	Not included in the assessment.
Cairnmore Farm Extension	Common gull activity in the south of the site attributed to birds flying to and from the SPA. No significant movement of common gulls within the study area. Collision risk assessment estimated an annual collision risk of 0.079 birds. The development was considered to have a negligible impact on common gull populations from the SPA.
Clashindarroch	4,792 flights were recorded, of which 99% were at collision risk height, however only c. 0.7% were at risk from the proposed wind farm area. The survey data lead to predicted collision rates ranging from one every 7.5 months (95 % avoidance) to one every 3.1 years (99 % avoidance). The development was considered unlikely to affect breeding populations at the SPA.
Dorenell	Not included in the assessment.
Dummuie	No information available.
Edintore	Development would have no adverse effects on common gull populations from the SPA due to separation distance.
Glens of Foudland	Did not breed within the survey area. A low number of flightlines were recorded and birds were recorded foraging in fields to the south of the site during winter and early spring. Common gull was not included in the collision risk assessment.
Hill of Tillymorgan	No adverse impacts were envisaged.
Hill of Towie	<i>No data available</i>
Hill of Towie 2	Ten flightlines of two to five individuals recorded and a flock of 70 birds in 2011. The site was assigned a High Local value for this species. Common gull was not included in the collision risk assessment as the site was not considered to be an important area for the species in terms of breeding or as a flight corridor.
Kildrummy	Not included in the assessment.
Rothes	No adverse impacts were predicted (based on information in Rothes III ES)
Rothes II	No adverse impacts were predicted (based on information in Rothes III ES)
Rothes III	Not included in the assessment.

Conclusion

- 4.3.6 There are a small number of wind farm projects within the potential core ranging distance from the SPA where common gull have been considered any detail in the impact assessments. The rates of annual collision, where reported, are all very low and if assumed to be additive with the predicted rates for Clashindarroch and Clashindarroch II wind farms would still be well below any reasonable threshold of potential importance for the SPA population.

- 4.3.7 There is considered to be no potential for any 'in combination' effects, from other plans or projects considered in this report, that would justify any change to the conclusions of this assessment.

4.4 Conclusions

- 4.4.1 The potential effects of the proposed development on the Tips of Corsemaul and Tom Mor SPA have been considered in this assessment. The purpose of this document is to help inform the Habitats Regulations Appraisal that the competent authority (in this case Scottish Government) will have to make when determining the planning application. The competent authority may only agree to the proposals after having ascertained that they will not, in combination with other plans or projects, adversely affect the integrity of the site in view of its qualifying interests and conservation objectives.
- 4.4.2 There will be no direct or indirect effects on SPA habitats from the Clashindarroch II wind farm proposed development. This assessment has focused on the potential for the project to result in collision mortality and barrier effects for breeding common gulls ranging from and returning to the SPA colony sites. It has been shown that only negligible effects are possible, i.e. effects that are irrelevant in terms of the factors affecting the key demographic processes of population growth and decline. Other factors, which cannot be influenced by the proposed wind farm, such as climate, predation, disease, land use changes, are likely to be driving the colony declines that have been recorded in recent years.
- 4.4.3 The potential implications of the project has been considered in view of the Tips of Corsemaul and Tom Mor SPA conservation objectives. It has been concluded that the project could not impede the SPA conservation objectives from being achieved or maintained.
- 4.4.4 In conclusion, taking into consideration the findings of this assessment, the Clashindarroch II wind farm proposal, alone or in combination with current plans and projects, could not result in an adverse effect on the integrity of the Tips of Corsemaul and Tom Mor SPA.

5. REFERENCES

- Banks, A.N., Burton, N.H.K., Calladine, J.R. & Austin, G.E. (2007). Winter gulls in the UK: population estimates from the 2003/04 -2005/06 Winter Gull Survey British Trust for Ornithology, Thetford. BTO Research Report No. 456.
- BirdLife International (2017). European birds of conservation concern: populations, trends and national responsibilities. BirdLife International Cambridge, UK.
- Coulson, J.C. (2019). Gulls. New Naturalist Series, William Collins, London.
- Craik, J. C. A. (1999). Breeding success of Common Gulls *Larus canus* in West Scotland, observations at a single colony. *Atlantic Seabirds*, (1) 169-181.
- Craik, J. C. A. (2000). Breeding success of Common Gulls *Larus canus* in West Scotland, comparisons between colonies. *Atlantic Seabirds*, (2) 1-12.
- Dierschke, V., Furness, R. W., Garthe, S. (2016). Seabirds and offshore wind farms in European waters: Avoidance and attraction. *Biological Conservation*, (202) 59–68.
- Eaton, M. A., Aebischer, N. J., Brown, A. F., Hearn, R. D., Lock, L., Musgrove, A. J., Noble, D. G., Stroud, D., & Gregory, R. D. (2015). Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. *British Birds* 108: 708-746.
- Furness, R.W. (2019). Avoidance rates of herring gull, great black-back gull and common gull for the use in the assessment of terrestrial wind farms in Scotland. SNH Research Report No. 1019. Available from: [<https://www.nature.scot/snh-research-report-1019-avoidance-rates-herring-gull-great-black-backed-gull-and-common-gull-use>].
- Garthe, S. & Hüppop, O. (2004). Scaling possible adverse effects of marine windfarms on seabirds, developing and applying a vulnerability index. *Journal of Applied Ecology*, (41) 724-734.
- Glutz von Blotzheim, U.N. & Bauer, K.M. (1982). *Handbuch der Vögel Mitteleuropas*. Band 8. Charadriiformes (3. Teil). Akademische Verlagsgesellschaft, Wiesbaden, Germany.
- Götmark, F. (1984). Food and foraging in five European *Larus* gulls in the breeding season: a comparative review. *Ornis Fennica*, (61) 9-18.
- Hötker, H., Thomsen, K.-M. & H. Jeromin (2006): Impacts on biodiversity of exploitation of renewable energy sources: the example of birds and bats - facts, gaps in knowledge, demands for further research, and ornithological guidelines for the development of renewable energy exploitation. Michael-Otto-Institut im NABU, Bergenhusen.
- Kubetzki, U., Garthe, S. & Hüppop, O. (1999), The diet of Common Gulls *Larus canus* breeding on the German North Sea coast. *Atlantic Seabirds*, 1(2) 57-70.
- Langston, R.H.W. (2010). Offshore wind farms and birds: Round 3 zones, extensions to Round 1 and Round 2 sites and Scottish Territorial Waters. RSPB Research Report No. 39. RSPB, Sandy, UK.

Mavor, R. A., Parsons, M., Heubeck, M. and Schmitt, S. (2006). Seabird numbers and breeding success in Britain and Ireland. Joint Nature Conservation Committee, Peterborough.

Mitchell, P. I. (2004) Seabird populations of Britain and Ireland Poyser, London.

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

Robinson, R. A. (2005) BirdFacts: profiles of birds occurring in Britain & Ireland. BTO, Thetford [<http://www.bto.org/birdfacts>], accessed 10th September 2019.

Vernon, J. D. R. (1972). Feeding Habitats and Food of the Black-headed and Common Gulls. Part 2 – Food. Bird Study, (19:4) 173-186.

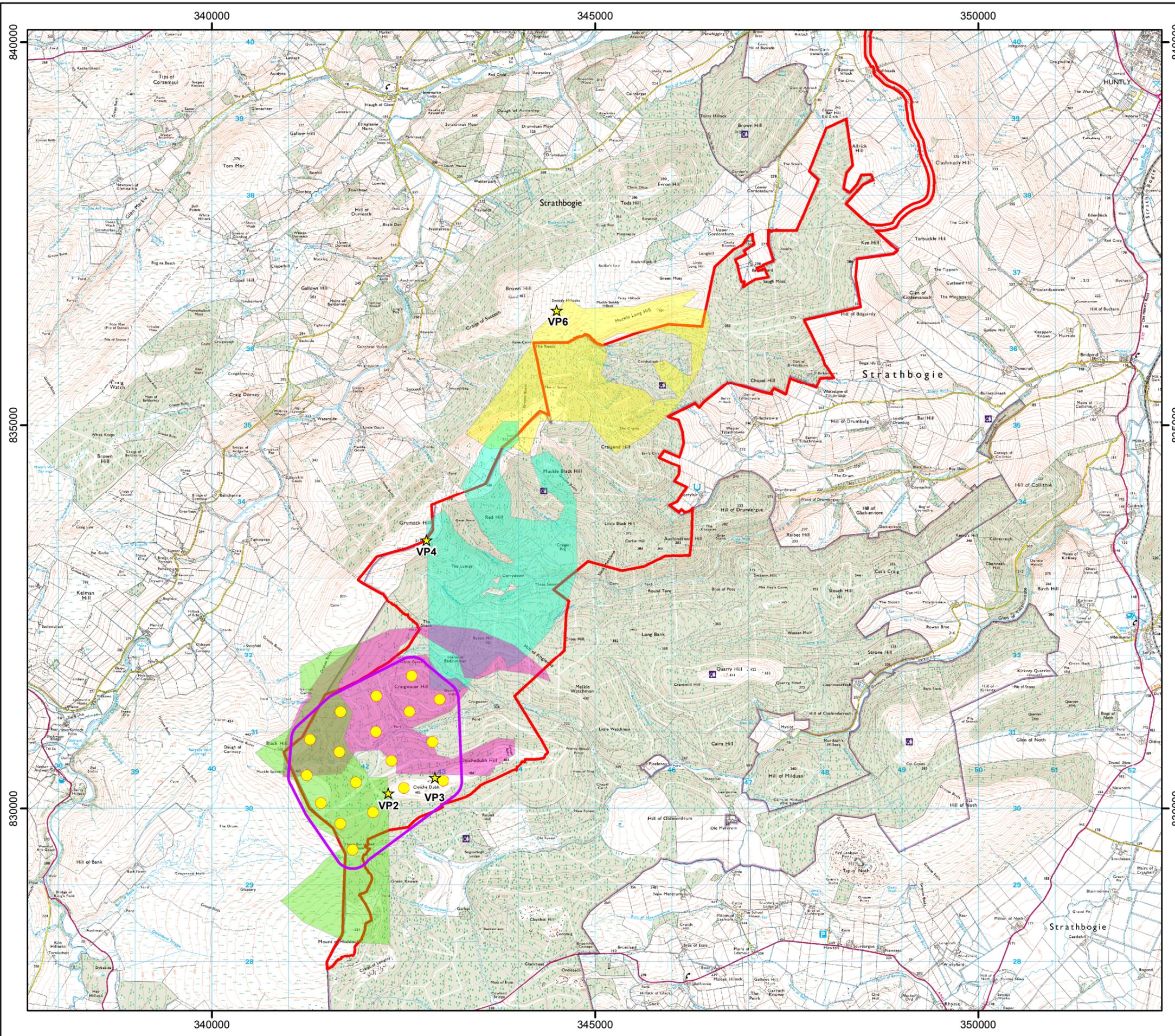
APPENDICES

Appendix 8.3.1 – Relevant Figures from Clashindarroch Wind Farm ES (2009)

CLASHINDARROCH WIND FARM

FIGURE 11.3 RPS Vantage Points Common Gull Survey and Viewsheds 2008

- Legend**
-  Planning application boundary
 -  Wind farm polygon
 -  Vantage point location
 -  Wind turbine
 -  VP2 2km Viewshed
 -  VP3 2km Viewshed
 -  VP4 2km viewshed
 -  VP6 2km viewshed



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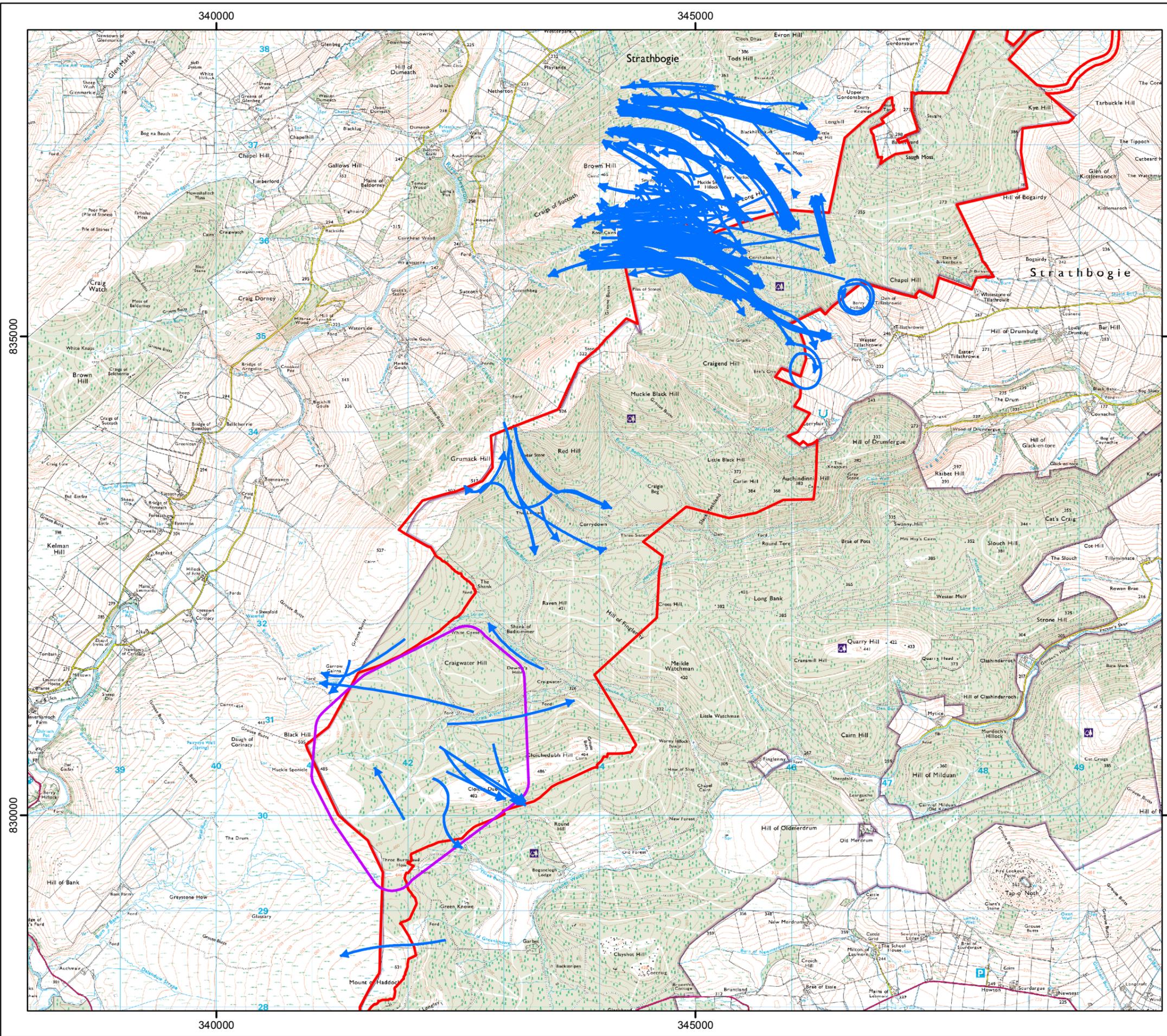
Drg No	6118 - 531 - PR - 002			Figure 11.3
Rev	B	Date	03/03/2009	
By	LT	Layout	LCLASH041	

CLASHINDARROCH WIND FARM

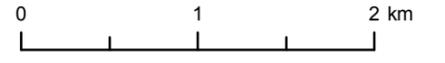
FIGURE 11.10 Common Gull Flightlines RPS 2008

Legend

-  Planning application boundary
-  Wind farm polygon
-  Common gull flight



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Figure 11.10

