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Contents

1 Introduction

Overview

1.1 Energy Isles Ltd (hereafter referred to as the Applicant) is to submit an application to the Scottish Government's Energy Consents Unit for permission to construct and operate a 29-turbine wind farm (hereafter referred to as the Proposed Development) on the island of Yell, which is one of the North Isles within the Shetland archipelago. The Proposed Development is located in the north-western corner of Yell to the north-west of Basta Voe at central Cartesian coordinates 450134, 1201392 (Figure 1 in Section 11).

1.2 Unless otherwise stated, reference to the Proposed Development within this report mean works within the Application red line boundary as shown on Figure 1.

1.3 There are 5 European sites located within 10 km of the Proposed Development: Bluemull and Colgrave Sounds pSPA, Otterswick and Graveland SPA, Fetlar SPA, Hermaness, Saxa Vord and Valla Field SPA and East Mires and Lumbister SAC. Summary details of these sites are presented in Section 3.

1.4 A Habitats Regulations Appraisal (HRA) needs to be completed in accordance with the requirements of Regulation 63 of the Conservation of Habitats and Species Regulations 2017 because of the potential for the Proposed Development to impact on a European site (see Section 6). Under Regulation 63(1) the applicant must provide such information as the competent authority may reasonably require for the purposes of the assessment, or to enable it to determine whether an appropriate assessment is required. This purpose of this report is to discharge the Applicant's duty under Regulation 63(2), and to facilitate the competent authority (Scottish Ministers) undertaking an appropriate assessment under Regulation 63. It is presented as a shadow Habitats Regulations Appraisal (sHRA)[1].

Site description

1.5 The Site, which extends to 1,679 ha, is located in the north-west part of Yell. The landscape is principally undulating peat moorland which ranges in elevation from 0 m to 112 m above sea-level (asl), with numerous waterbodies (ranging from bog pools to small lochs) and small burns. The moorland includes areas of grassland and the whole application area is subject to sheep grazing.

1.6 The Dalsetter Hill Road (known locally as the Old Cullivoe Road) runs from the head of Basta Voe, just south of the application area, to Cullivoe on the east coast of Yell; the Old Cullivoe Road runs along much of the eastern edge of the Site and part of it will be used to access the Site. From the track, the Site extends almost as far as the western coastal cliffs and rocky exposures, to the head of Gloup Voe in the north and the head of Basta Voe to the south.

Design evolution

1.7 The Proposed Development has been subject to ten iterative design changes, which were made during the design life-cycle that ran from November 2017 to January 2019. The design process has included:

- reduction of the Site application area to avoid the majority of the north-eastern and south-western lochs and lochans; and
- routing of the Site tracks and turbine locations to minimise impacts to the deeper peat deposits and limit the number of watercourse crossings.

[1] This document presents the results of a comprehensive Habitats Regulations Assessment; however, with regard to the legal process set out within the Conservation of Habitats and Species Regulations 2017, it is the competent authority who has the responsibility of undertaking a Habitats Regulations Assessment (HRA). This report is therefore described as a shadow HRA.

1.8 Other considerations have included avoidance of pool complexes, watercourses and gullies, wet peat, avian constraints including those relating to the RSPB reserve south of Gossa Water, the settlements at Gloup and Cullivoe, avoidance of the Gossa Water catchment area and key sensitive areas, including some of the more visually important landscape character areas (e.g. the south-west coastline at Gerherda, the open headland at North Neaps and the coastal edge at Vignon and Burgi Geos) (refer to Chapter 2 of the EIA Report for further details).

Development Proposal

1.9 The Proposed Development consists of a 29-turbine wind farm that will be constructed on an area of moorland extending to 1,679 ha. The operational lifespan is expected to be 30 years. Each turbine will be a maximum of 200m height to blade tip, with the nacelle mounted on a tapering tubular steel tower. Associated works will include cabling, access tracks, borrow pit search areas, temporary crane pads and a substation.

1.10 Turbines will be located on open moorland more than 0.5 km from the western coastal cliffs, more than 0.3 km from Gloup Voe in the north and more than 1.0 km from Basta Voe to the south.

Definition of Terms

1.11 For clarity of understanding, the following terminology is used in this report:

- The **Proposed Development** refers to the proposed Energy Isles Wind Farm, comprising 29 turbines, cabling, access tracks, borrow pit search areas, temporary crane pads and substation. The layout of the Proposed Development is shown on Figure 1.
- The **Site** is defined as the area in which all proposed turbines and associated infrastructure are situated. The area occupied by the Site is 1679 ha. The Site boundary is shown in Figure 1.
- The **Survey Area** is defined as all land within 500 m of the original Site boundary. This perimeter is based on industry guidance (SNH, 2017) that recommends that the survey area should be extended to survey for birds at least 500 m beyond a wind farm development. The Survey Area extends to greater than 500 m north and south of the Proposed Development Site (due to subsequent contraction of the Site). However, a small section of the Site extends outside of the Survey Area at Dalsetter to allow for Site access, a construction compound and borrow pit search area. The extent of the Survey Area is shown on Figure 1. The Survey Area for red-throated diver *Gavia stellata* extends beyond the 500 m perimeter of the Site (following recommendations in SNH, 2017). For these surveys the Survey Area is referred to as 'Red-Throated Diver Survey Area' (extending to 1 km beyond the original Site boundary). The extent of the Red-Throated Diver Survey Area is shown on Figure 2.
- The **Ecological Zone of Influence** (EZoI) is defined as the area within which there may be ecological features subject to effects from the Proposed Development (see paragraphs 3.2 et seq).

2 Habitats Regulations Appraisal

Legislation

2.1 The Conservation of Habitats and Species Regulations 2017, referred to as the 'Habitats Regulations,' transpose the requirements of the European Birds and Habitats Directives[2] into Scottish legislation. The Birds Directive aims to protect rare and vulnerable birds and the habitats that they depend upon and this is achieved in part through the classification of Special Protection Areas (SPAs). The Habitats Directive aims to protect plants, habitats and animals other than birds, and this is achieved in part through the creation of Special Areas of Conservation (SACs). Article 6(1) and (2) of the Habitats Directive require that Member States establish management measures for these areas, to avoid deterioration of their ecological interest.

2.2 The UK is also a contracting party to the Ramsar Convention[3], which seeks to protect wetlands of international importance, especially those wetlands utilised as waterfowl habitat. It is Scottish Government policy[4] that all competent authorities should treat Ramsar sites similarly as if they are fully designated European sites.

2.3 Collectively, all formally proposed and fully classified or designated SPAs and SACs form a pan-European Union network of protected areas known as Natura 2000. Within this report the term European sites has been used to include all formally proposed or listed Ramsar sites as well as all formally proposed or listed SPAs and SACs, which are all afforded the same level of protection.

Habitats Regulations Appraisal Process

2.4 The requirements of the Habitats Regulations with regard to the implications of plans or projects are set out within Regulation 63. The step-based approach implicit within this regulation is referred to as a 'Habitats Regulations Appraisal', which is the term that has been used throughout this report.

2.5 It is incumbent on any public body (referred to as a competent authority within the Habitats Regulations) to carry out a Habitats Regulations Appraisal where they are proposing to carry out a project, implement a plan or authorise another party to carry out a plan or project. Competent authorities are required to record the process undertaken, ensuring for the purposes of Article 6(3) that there will be no adverse effects on the integrity of any European site as a result of a plan or project whether alone or in combination with other plans or projects. If an adverse effect on integrity is identified, it is necessary to apply the further tests set out in Article 6(4).

Assessment Stages

2.6 The European Commission has developed guidance in relation to Articles 6(3) and 6(4) of the Habitats Directive[5], and this recommends a four Stage approach to addressing the requirements of these Articles (Table 1). Taking into account this guidance the assessment methodology set out in this sHRA has been structured to meet the requirements of the Habitats Directive.

[2] Council Directive on the conservation of natural habitats and of wild fauna and flora of 21st May 1992 (92/43/EEC) and Council Directive on the conservation of wild birds of 2nd April 1979 (70/409/EEC) consolidated by the Birds Directive 2009 (2009/147/EC).

[3] Convention on wetlands of international importance especially as waterfowl habitat, Ramsar, Iran, 2/2/71 as amended by the Paris protocol of 3/12/92 and the Regina amendments adopted at the extraordinary conference of contracting parties at Regina, Saskatchewan, Canada 28/5 – 3/6/87, most commonly referred to as the 'Ramsar Convention.'

[4] In July 2018 Scottish Government reiterated and clarified their policy regarding Ramsar sites in a document entitled 'Scottish Government policy on protection of Ramsar sites'.

[5] European Commission (2001). Assessment of plans and projects significantly effecting Natura 2000 site. Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC. Published November 2001.

Stage 1 – Screening

2.7 This stage identifies the likely effects of the proposed project on the qualifying features (species and habitats) of any European site, either alone or in combination with other plans or projects. Specifically, this stage considers whether these effects are likely to be significant. The proposal will require 'appropriate assessment' (Stage 2 of HRA) if it is considered that it is likely to have a significant effect on a European site, i.e. where any aspect of the proposal (considered without mitigation) risks a significant effect on any European site.

2.8 Stage 1 includes the following elements:

- Determining whether the project or plan is directly connected with or necessary to the management of a European site;
- Describing the project or plan;
- Identifying the potential effects on the European site;
- Assessing the significance of any effects on the European site; and
- Describing and characterising other projects or plans that in combination have the potential for having significant effects on the European site (this is not required if it is concluded that the project or plan is likely to have a significant effect alone).

Stage 2 – Appropriate Assessment

2.9 If it is considered that a plan or project is likely to have a significant effect on a European site (as explained above), the requirements of Stage 2 of HRA are triggered. This stage considers the effects of the Proposed Development on the integrity of a European site, alone or in combination with other plans or projects. The assessment should consider the implications for the European site in view of the site's conservation objectives.

2.10 If adverse effects are identified or may arise, this assessment should also consider measures to mitigate the identified effects. This assessment must contain findings capable of removing all reasonable scientific doubt as to the effects of the proposed works on the protected area concerned. All aspects of the project which can, by themselves or in combination with other plans or projects, affect the conservation objectives of that European site must be identified in the light of the best scientific knowledge available in the field.

2.11 Consent may only be granted for the project (without resort to Stages 3 and 4) if the competent authority is convinced of the absence of adverse effects of the project (whether alone or in combination with other plans or projects) on the integrity of any European site.

2.12 If mitigation is not possible and adverse effects on a European site's integrity remain or there is a risk that they remain, then the process in respect of applications for consent must proceed to Stage 3 of HRA.

Stage 3 – Assessment of alternative solutions

2.13 If the risk of adverse effects on integrity cannot be ruled out (e.g. it is not possible to mitigate the impacts to a level which do not adversely affect site integrity) in Stage 2, this Stage 3 of HRA requires examination of alternative ways of achieving the objectives of the plan or project that avoid or reduce adverse impacts on the integrity of the relevant European site(s). Consent should only be granted where there is no alternative way of implementing the project or plan or achieving its objectives which would avoid adversely impacting on the integrity of any European site, and where the further Stage 4 is satisfactorily addressed.

Stage 4 – Assessment where no alternative solutions exist and where adverse impacts remain

2.14 Stage 4 of HRA requires the relevant public body to consider whether or not there are imperative reasons of overriding public interest (IROPI), which in the case of projects or plans affecting "priority"[6] habitat or species may only include reasons relating to human health or safety considerations or beneficial consequences of primary importance to the environment. If such considerations exist and Stage 3 of the HRA has been satisfactorily completed, it is necessary to carry out Stage 4 of the HRA, which consists of the identification and assessment of compensatory measures.

2.15 IROPI and compensatory measures are not discussed further in this sHRA, as on the Applicant's assessment, they are not engaged in respect of the Proposed Development.

Importance of transparency of the HRA process

2.16 Through these various Stages of HRA, the Habitats Directive and the guidance published by the European Commission promote the adoption of a hierarchy of avoidance followed by mitigation and ultimately compensation. Consequently the first step is to ensure that the Proposed Development avoids negative impacts on European sites. If potential negative impacts are identified and avoidance is not feasible, then mitigation measures need to be applied such that no adverse effect on the integrity of any European site arises.

2.17 If impacts cannot be fully mitigated then the plan or project for which planning permission is sought should be taken forward to Stages 3 and 4 of HRA. HRA Approval cannot be granted (and such projects cannot proceed) unless the process equivalent to Stages 1 and 2 of HRA concludes beyond reasonable scientific doubt that the relevant proposal will not adversely affect the integrity of the European site.

Table 1: Stages in the HRA process

Stage	Description	Legislative Context
Stage 1: Screening	Assessment of whether a plan or project, either alone or in combination with other plans or projects, is likely to have a significant effect on any European site.	Article 6(3) of the Habitats Directive Regulation 63 of the Habitats Regulations
	Determining whether the project or plan is directly connected with or necessary to the management of a European site.	
	Describing the project or plan.	
	Identifying the potential effects on the European site.	
	Assessing the significance of any effects on the European site.	
	Describing and characterising other projects or plans that in combination have the potential for having significant effects on the European site.	

[6] The Birds Directive does not identify priority habitat or species, so the second paragraph of Article 6(4), which limits the scope of IROPI in such cases is not relevant to impacts upon an SPA.

Stage	Description	Legislative Context
Stage 2: Appropriate Assessment	Consider the impacts of the development proposals to determine whether or not it is possible to conclude beyond reasonable scientific doubt that the development will not result in any adverse effect on the integrity of any European site, either alone or in combination with other plans or projects and with reference to the site's conservation objectives. Consider measures to mitigate the identified impacts. Prepare an Appropriate Assessment Report for consultation with SNH. Consent may be granted for the project if it is possible to conclude beyond reasonable scientific doubt that the development will not result in any adverse effect on the integrity of any European site, either alone or in combination with other plans or projects.	Article 6(3) of the Habitats Directive Regulation 63 of the Habitats Regulations
Stage 3: Assessment of alternative solutions	Assess whether there is any alternative solution to implementing the project i.e. one that better respects European sites. If no such alternative solution exists, the process continues to Stage 4. If there is an alternative solution then the project as proposed fails the HRA, and consent cannot be granted.	Article 6(4) of the Habitats Directive Regulation 63 of the Habitats Regulations
Stage 4: Assessment of IROPI and compensatory measures	Assessing whether a plan or project can be justified as needed for 'imperative reasons of overriding public interest' (IROPI); and whether adequate compensatory measures can be secured.	Article 6(4) of the Habitats Directive Regulation 63 of the Habitats Regulations

2.18 Table 1 summarises the requirements and legislative context for the four HRA Stages. In subsequent sections of this sHRA further details are provided about the method that has been adopted when collating information intended to assist Scottish Ministers in completing Stages 1 and 2 of the HRA in respect of the application for permission for the Proposed Development.

Case Law

2.19 A recent judgment by the Court of Justice of the European Union (People Over Wind and Sweetman, 12 April 2018, C-323/17) has provided clarification as to when avoidance or reduction (i.e. mitigation) measures can be considered within the HRA process. The key finding of this case is:

2.20 "*In the light of all the foregoing considerations, the answer to the question referred is that Article 6(3) of the Habitats Directive must be interpreted as meaning that, in order to determine whether it is necessary to carry out, subsequently, an appropriate assessment of the implications, for a site concerned, of a plan or project, it is not appropriate, at the screening stage, to take account of the measures intended to avoid or reduce the harmful effects of the plan or project on that site*".

2.21 This case means that Scottish Ministers cannot rely on avoidance or reduction measures that allow a conclusion of 'no likely significant effect' to be reached at the 'screening' stage in order to avoid undertaking an Appropriate Assessment. Instead it is necessary to consider if a 'likely significant effect' of the Proposed Development would occur in the absence of these measures (i.e. complete Stage 1 of the HRA process). If so, it is necessary to move to the next stage (i.e. Stage 2 of the HRA process), at which point the mitigation measures can be considered.

2.22 This sHRA takes into account the judgment in People Over Wind and Sweetman. It also takes into account a further judgment of the Court of Justice of the European Union in the case of Holohan & Ors. v An Bord Pleanála (7 November 2018, C-461/17). In summary, this judgment provided additional clarification about the scope of the required assessment, requiring that habitats and species associated with a European site which are not themselves qualifying features must nevertheless be considered if impacts on those non-qualifying habitats and species are liable to affect the conservation objectives of the site or if the development will impact on features that are necessary to the conservation of the site's qualifying features.

Consultation

Scottish Natural Heritage (SNH)

2.23 Formal consultation with Scottish Natural Heritage (SNH) commenced in February 2016. The initial meeting and subsequent discussions aimed to agree the scope of the ornithology surveys and the locations of VPs and corresponding viewsheds. It was also noted during the meeting that the largest constraints on the Proposed Development were the proximity of the European designated sites and the various qualifying species for which they are designated.

2.24 SNH also provided comments on the scope of baseline ecological and ornithological survey, including the selection of vantage point locations.

2.25 As part of the consultation process, SNH highlighted the proximity of the Otterswick and Graveland SPA, which is classified for its breeding population of red-throated diver (Energy Isles Wind Farm EIA Report, Chapter 6 Ornithology, Section 6.4.1 et seq). It also provided historic breeding records of this species within the Site and wider area. In August 2016, it confirmed that having carried out an appraisal of impacts on the Otterswick and Graveland SPA, they were "*satisfied from the results of one year's targeted vantage point observation that the proposal will have no likely significant effect on red-throated diver population of Otterswick and Graveland SPA and no further consideration of impacts on this site is necessary*".

2.26 At this stage, the cumulative effects of the Proposed Development and two other local wind farms (Beaw Field and Viking) on a number of bird species were also considered by SNH. It found that the predicted mortality of red-throated diver would be unlikely to have an adverse effect on the population and that disturbance, displacement and habitat loss of red-throated diver, golden plover, curlew, merlin and Arctic skua would be minimal.

2.27 In consultation letters received December 2017 and February 2018 (Energy Isles Wind Farm EIA Report, Chapter 6 Ornithology, Section 6.4.1 et seq), SNH expressed its continued concerns regarding impacts of the Proposed Development on the qualifying red-throated diver population of the Bluemull and Colgrave Sounds proposed Special Protection Area (pSPA).

RSPB

2.28 Formal consultation was sought with RSPB Scotland in August 2016. In its scoping response letter (Energy Isles Wind Farm EIA Report, Chapter 6 Ornithology, Section 6.4.5 et seq), the RSPB expressed concern regarding the proximity of turbines and access tracks to known breeding sites for red-throated diver (at Litla Water). They recommended the following mitigation measures should be adopted:

- No construction of Turbines 13 and 15 takes place during the period March-September inclusive, unless survey (approved by the planning authority) confirms that no red-throated diver are nesting within 500 m of these locations.
- A programme of post-construction bird monitoring.
- Establishment of a Habitat Management Group (HMG) to oversee (and make reasonable changes to) a Habitat Management Plan (HMP) and to review the data produced by the post-construction monitoring.
- The HMP (covering the full lifespan of the wind farm) should be submitted three months prior to commencement.

- The annual monitoring reports should be submitted to the HMG, with information on Schedule 1 species remaining confidential.

2.29 In March 2018, further consultation was sought with RSPB Scotland following revision of the layout for the scheme (Energy Isles Wind Farm EIA Report, Chapter 6 Ornithology, Section 6.4.5 et seq). RSPB stated that the majority of the concerns raised in the first consultation letter remained valid. It was noted that a number of other species of conservation interest are likely to be present at the site (including dunlin, which is a qualifying feature of the Fetlar SPA and which was the only qualifying species mentioned in the response). Additional concerns were:

- The site's proximity to the Bluemull and Colgrave Sounds pSPA, which is proposed for the foraging habitat it provides for breeding red-throated diver. It stated that the EIA should fully consider the effects of the development on the pSPA.
- The potential for habitat loss and fragmentation by the infrastructure.
- Uncertainty as to whether a comparable control / reference site had been surveyed, in line with SNH guidance.
- The nature of electricity cabling and risk of bird collisions given the open nature of the Site.
- Potential impacts of the Proposed Development on some mobile species that breed on the Yell RSPB reserve.

Shetland Bird Club (SBC)

2.30 In January 2018 SBC stated concerns (Energy Isles Wind Farm EIA Report, Chapter 6 Ornithology, Section 6.4.7) regarding the impact of the Proposed Development on breeding red-throated divers associated with the nearby SPAs, and on the local populations of merlin, dunlin, golden plover, whimbrel, Arctic skua, curlew, lapwing, oystercatcher, snipe and redshank. The potential for adverse effects on the blanket bog habitat that supports these species was also highlighted (which is relevant with reference to the recent judgment Holohan & Ors. v An Bord Pleanála, 7 November 2018, C - 461/17).

Shetland Amenity Trust (SAT)

2.31 In comments received in December 2017 (Energy Isles Wind Farm EIA Report, Chapter 6 Ornithology, Section 6.4.8), SAT briefly discussed the presence of breeding red-throated diver in the area, as well as dunlin, golden plover and merlin. The presence of curlew, lapwing and skylark was also noted.

Shetland Islands Council (SIC)

2.32 In formal consultation, the SIC requested that a number of comments made by SNH, RSPB, SBC and SAT are taken into account (Energy Isles Wind Farm EIA Report, Chapter 6 Ornithology, Section 6.4.9 et seq). These requirements are summarised below.

2.33 The impact on the nearby Bluemull and Colgrave Sounds pSPA and red-throated diver (a qualifying species). In particular, the potential for collision with turbines, disturbance resulting in displacement from lochs and increased energetic demands (as a result of avoiding the turbine array) during the chick-rearing period. The EIA Report must include sufficient information for a full HRA.

2.34 Due regard is made to the conservation of: red-throated diver, merlin, golden plover and dunlin, particularly the risk of disturbance, displacement, barrier effects and collision with turbines. The EIA Report must address mitigation (including the removal of turbines from particularly sensitive areas).

2.35 It stated that "the planning service is broadly content with the proposed scope of ornithological and ecological surveys set out in the scoping report", but that "the applicant should however pay close attention to the comments made by the RSPB and SNH to the ECU".

3 Scope of the Assessment

3.1 There are no standard criteria for determining the spatial scope of a HRA. In this case the decision to include or exclude European sites from an assessment is supported by application of the source-pathway-receptor model, which highlights whether there is any potential pathway that connects development to any European sites. In this case the spatial scope of the assessment is informed by identifying the impacts that could potentially arise as a result of the development, assessing the spatial and temporal scope of those impacts and understanding the effects on sensitive receptors that might arise.

Ecological Zone of Influence

3.2 The Ecological Zone of Influence (EZoI) is defined as the area within which there may be ecological features subject to effects from the Proposed Development. Such effects could be direct, e.g. habitat loss resulting from land-take, or indirect, e.g. noise or visual disturbance causing a species to move out of the EZoI. The EZoI was determined through:

- Review of the existing baseline conditions based on desk study results, field surveys and information supplied by consultees;
- Identification of known sensitivities of ecological features;
- The outline design of the Proposed Development and approach to construction; and
- Through liaison with other technical specialists involved in the assessment, e.g. hydrologists and noise specialists.

3.3 A 5 km EZoI has been adopted for SACs as the only mobile species associated with SACs within 10 km is otter at Hascosay SAC (which is an island approximately 6 km to the south-east of the Site and separated from Yell by the 770m wide Hascosay Sound). A 10 km EZoI has been adopted for SPAs and pSPAs, as these sites have qualifying features that are highly mobile (although Ramna Stacks and Gruney SPA is located 10.3 km to the south-west of the Site, and therefore just outside the EZoI, this SPA is only noted for Leach's petrel, which is a marine species and therefore unlikely to be encountered within the Site). These EZoIs have been adopted in this assessment as they encompass all sites that could potentially be affected by those impact mechanisms that are most wide-ranging. Potential impact mechanisms are:

- Habitat loss and disturbance;
- Noise / vibration related disturbance;
- Visual disturbance;
- Increased mortality.

3.4 Habitat loss and disturbance is only likely to have an effect on receptors within or close to the Site boundary. With the exception of the Old Cullivoe Road, all other infrastructure will be located at least 200 m or more away from the Site boundary. As the nearest European site is 0.3 km to the south-east of the Site boundary (Bluemull and Colgrave Sounds pSPA) it is considered very unlikely that habitat loss and disturbance will occur within this or any other European site.

3.5 Noise and vibration related disturbance is only likely to have an effect on receptors within an EZoI that is defined by the spatial extent over which noise and vibration impacts are predicted to arise. An assessment of noise related impacts has concluded that any effects will either be neutral or minor for all Noise Sensitive Receptors[7] during the construction and decommissioning phases of the Proposed Development (Energy Isles Wind Farm EIA Report, Chapter 8 Noise, Table 8.16). The same conclusion is reached for the operational phase of the development (Energy Isles Wind Farm EIA Report, Chapter 8 Noise, Table 8.18).

[7] Noise Sensitive Receptors identified within Chapter 8 of the Energy Isles Wind Farm EIA Report are either single dwellings or representative of a group or cluster of dwellings.

3.6 The most distant NSR from the Proposed Development was 3.1 km to the east-south-east (Energy Isles Wind Farm EIA Report, Chapter 8 Noise, Table 8.3). The adoption of a 10 km EZoI is therefore highly precautionary with respect to noise impacts.

3.7 Similarly the extent of visual impacts will also be limited by the distance over which people and machinery might be seen. This is likely to be constrained by topography and vegetation and, taking a precautionary view, is unlikely to extend more than 1 km. It should also be noted that the distances at which birds react to people and machinery varies between species, with responses to vehicles generally occurring at shorter distance than responses to people where studies have been completed (e.g. Ruddock & Whitfield, 2007).

3.8 Whilst noise, vibration and visual disturbance effects arising from the Proposed Development are likely to be limited in their spatial extent, a further consideration is the mobility of some SPA / pSPA qualifying species, i.e. birds. For example, the qualifying species from European sites may fly across the Site or utilise habitats within the Site, i.e. the Site includes land that is functionally linked to a European site. It is therefore possible that qualifying birds that visit the Site or commute across it could be affected by the Proposed Development, thereby affecting the integrity of a European site.

3.9 A 10 km EZoI is considered to be precautionary as the identified impact mechanisms are unlikely to extend this far. This EZoI is also considered to be sufficiently precautionary for the purposes of determining whether land within the Site is used by qualifying species from SPAs / pSPAs and is therefore functionally linked with those sites. If birds are breeding within a European site it is reasonable to suggest they will typically use areas of terrestrial habitat within 10 km of it for provisioning: where birds range beyond 10 km this will be to areas of sea offering better foraging opportunities than can be found locally.

3.10 A 10 km EZoI is also considered to be precautionary with reference to industry guidance for assessing the impacts of proposed wind farm developments on birds (SNH, 2017). The SNH guidance states: '*depending on the species using the area, there may be a need for further species or species group-specific survey to establish nest, roost or display sites up to 6 km from the proposed development site*'. In the case of red-throated diver the recommended survey area is 1 km.

4 Identification of Relevant European sites

European Sites

4.1 There are 5 European sites located within 10 km of the Proposed Development: Bluemull and Colgrave Sounds pSPA, Otterswick and Graveland SPA, Fetlar SPA, Hermaness, Saxa Vord and Valla Field SPA and East Mires and Lumbister SAC. Summary details of these sites are presented below in Table 2 (see Figure 3, Section 11).

4.2 East Mires and Lumbister SAC is located 2 km to the south of the Proposed Development. The SAC is of importance because of the blanket bog habitat that it supports. Blanket bog is an ombrotrophic (rainwater fed) habitat, and the 2 km separation distance between the Proposed Development and the SAC means that hydrological impacts are highly unlikely (Energy Isles Wind Farm EIA Report, Chapter 10 Geology, Peat, Hydrology & Hydrogeology, paragraph 10.6.176). The separation distance is also likely to protect the SAC from other construction-related impacts such as dust deposition: guidance (Holman *et al,* 2014) indicates that the effects of dust from construction projects are unlikely to extend more than 50m.

4.3 Ramna Stacks and Gruney SPA is located 10.3 km to the south-west of the Site. The SPA is of importance as it is one of only seven known nesting localities in the EU for Leach's Petrel *Oceanodroma leucorhoa*. This species spends most of its time at sea, only approaching land at night to breed[8]. Consequently this species would not be expected to use the Proposed Development and so this site has been screened out from appropriate assessment.

Table 2: European sites within 10 km of the Site considered within the shadow HRA

Name	Designation	Qualifying interest/ Designated Feature	Distance (km) /Bearing from Site Boundary	Distance (km) /Bearing from Nearest Turbine
Bluemull and Colgrave Sounds	pSPA	Supporting (foraging) habitat for breeding red-throated diver.	0.3 SE	1.7 SE (T16)
Otterswick and Graveland	SPA	Red-throated diver (breeding), 27 pairs representing at least 2.9% of the breeding population in Great Britain (1992-1996).	3 SW	4.1 SW (T14)
Fetlar	SPA	Supporting populations of European importance of Annex I species: Arctic Tern *Sterna paradisaea*, 520 pairs representing at least 1.2% of the breeding population in Great Britain (Three year mean, 1994-1997) Red-necked Phalarope *Phalaropus lobatus*, 30 pairs representing at least 75.0% of the breeding population in Great Britain (Count, as at mid-1990s) Supporting populations of European importance of migratory species: Dunlin *Calidris alpina*, 90 pairs	3.9 SE	4.5 SE (T20)

[8] https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/leachs-petrel/

Name	Designation	Qualifying interest/ Designated Feature	Distance (km) /Bearing from Site Boundary	Distance (km) /Bearing from Nearest Turbine
		representing at least 0.8% of the breeding Baltic/UK/Ireland population (Count, as at late 1980s-early 1990s) Great Skua *Catharacta skua*, 512 pairs representing at least 3.8% of the breeding World population (Count, as at 1992) Whimbrel *Numenius phaeopus*, 65 pairs representing <0.1% of the breeding Europe/Western Africa population (Count, as at late 1980s-early 1990s). Supporting a seabird assemblage of international importance: 22,000 individuals including: Arctic skua, fulmar *Fulmarus glacialis*, great skua, Arctic tern *Sterna paradisaea*, red-necked phalarope *Phalaropus lobatus*.		
Hermaness, Saxa Vord and Valla Field	SPA	Supporting populations of European importance of Annex I species: Red-throated Diver, 28 pairs representing at least 3.0% of the breeding population in Great Britain (1994-1996) Supporting populations of European importance of migratory species: Gannet *Morus bassanus*, 12,000 pairs representing at least 4.6% of the breeding North Atlantic population (Count, as at 1994) Great skua 630 pairs representing at least 4.6% of the breeding World population (Count, as at 1997) Puffin *Fratercula arctica*, 25,400 pairs representing at least 2.8% of the breeding population (Count, as at 1987) Supporting a seabird assemblage of international importance: 52,000 individual seabirds including: guillemot *Uria aalge*, kittiwake *Rissa tridactyla*, shag *Phalacrocorax aristotelis*, fulmar *Fulmarus glacialis*, puffin *Fratercula Arctica*, great skua *Catharacta skua*, gannet *Morus bassanus*.	6.1 NE	6.7 NE

Name	Designation	Qualifying interest/ Designated Feature	Distance (km) /Bearing from Site Boundary	Distance (km) /Bearing from Nearest Turbine
East Mires and Lumbister	SAC	Blanket bog	2.0 S	3.1 S (T16)

Bluemull and Colgrave Sounds pSPA

Habitat description

4.4 Bluemull and Colgrave Sounds proposed Special Protection Area (pSPA) stretches from the north coast of Yell through Bluemull Sound down through Colgrave Sound as far south as the White Hill of Vatsetter (approximately 3km south of Hascosay). The coastline of the pSPA is mostly cliff with occasional sandy beaches and bays.

4.5 The inshore waters throughout the site are generally less than 40m deep but offshore, especially to the south of Fetlar, water depth rapidly increases. Sediments are largely gravel and sand and support a diversity of fish, polychaete worms, gastropod and bivalve molluscs.

Qualifying Features

4.6 Bluemull and Colgrave Sounds proposed Special Protection Area (pSPA) has been selected as an important foraging area for breeding red-throated diver, falling within the foraging area of a high concentration of nesting birds in Yell and South Unst. The protection of these inshore waters will make a key contribution to the maintenance of this species in its natural range in UK marine waters and form part of a coherent network of sites at a European level.

Conservation Objectives – qualifying species

4.7 The draft conservation objectives for the SPA are described as follows: '*To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, subject to natural change, thus ensuring that the integrity of the site is maintained in the long-term and it continues to make an appropriate contribution to achieving the aims of the Birds Directive for each of the qualifying species*.'

Condition assessment

4.8 As Bluemull and Colgrave Sounds is a proposed SPA no condition assessment information is currently available.

Otterswick and Graveland SPA

Habitat description

4.9 Otterswick and Graveland Special Protection Area comprises two areas of open moorland with numerous pools and lochans on Yell, Shetland. Otterswick is located in the south of Yell, while Graveland is a peninsula on the west of Yell. The site rises from sea-level on Graveland, to 205m at Ward of Otterswick. Inland areas are dominated by blanket bog, with some stretches of dry heather moorland. The blanket bog is variable in quality, with considerable areas of eroded peat, especially on the eastern side of Otterswick. However, some of the erosion is re-vegetating. A band of maritime grassland extends along the coastal stretch of the Graveland Peninsula.

Qualifying Features

4.10 Otterswick and Graveland SPA qualifies under Article 4.1 of the Directive (79/409/EEC) by regularly supporting a breeding population of European importance of the Annex I species red-throated diver Gavia stellata (average of 26 pairs during 1992-99, 3% of the British population).

Conservation Objectives – qualifying species

4.11 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

4.12 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

Condition assessment

4.13 Scottish Natural Heritage has published information about the condition of the qualifying features of the Otterswick and Graveland SPA[9]. The condition of the SPA was last assessed on 6 December 2018 at which time 100% of the site was considered to be in 'unfavourable declining' condition.

Fetlar SPA

Habitat description

4.14 Fetlar is an island in the Shetland group, lying to the east and south respectively of the larger islands of Yell and Unst. The species-rich heath, bog and mire communities on the island support an important and characteristic breeding bird community, with the cliffs, rocky shores, and adjacent coastal waters important for breeding seabirds.

4.15 Fetlar SPA overlaps North Fetlar Site of Special Scientific Interest (SSSI), Lamb Hoga SSSI and Trona Mires SSSI. The seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface.

Qualifying Features

4.16 Fetlar SPA qualifies under Article 4.1 by regularly supporting populations of European importance of the Annex 1 species: red-necked phalarope *Phalaropus lobatus* (23 pairs, 80% of the GB population) and Arctic tern *Sterna paradisaea* (1,065 pairs, 1% of the GB population).

4.17 Fetlar SPA further qualifies under Article 4.2 by regularly supporting populations of European importance of the migratory species: whimbrel *Numenius phaeopus* (65 pairs, <0.1% Europe/W Africa biogeographic population); great skua *Stercorarius skua* (508 pairs, 3.7% of world biogeographic population) and dunlin *Calidris alpine schinzii* (90 pairs, 0.8% of the temperate European biogeographic population).

4.18 Fetlar SPA also qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds. The site regularly supports 22,000 seabirds including nationally important populations of the following species: Arctic skua *Stercorarius parasiticus* (130 pairs, 4% of the GB population), Northern fulmar *Fulmarus glacialis* (9,500 pairs, 2% of the GB population), great skua (508 pairs), Arctic tern (1,065 pairs) and red-necked phalarope (23 pairs).

[9] Source: https://www.environment.gov.scot/data/data-analysis/protected-nature-sites/?pagenumber=1&resetmap=true&siteid=8563, accessed 24 January 2019

Conservation Objectives – qualifying species

4.19 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

4.20 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

Condition assessment

4.21 Scottish Natural Heritage has published information about the condition of the qualifying features of the Fetlar SPA[10] and these are summarised below. The condition of the SPA was last assessed on 21 June 2016 for some qualifying features but some features were last assessed before this, the oldest assessment being for dunlin in 2003. The assessment has concluded that 50% of the SPA is in favourable condition and 50% is described as unfavourable recovering. With regard to the individual qualifying features, the following species are described as being in favourable condition: dunlin, great skua, red-necked phalarope and whimbrel. The following qualifying features are described as being in unfavourable condition: Arctic skua, Arctic tern, fulmar and the seabird assemblage.

Hermaness, Saxa Vord and Valla Field SPA

Habitat description

4.22 Hermaness, Saxa Vord and Valla Field Special Protection Area lies in the north-west corner of the island of Unst, Shetland, at the northernmost tip of Britain. It consists of 100-200 m high sea cliffs and adjoining areas of grassland, heath and blanket bog.

4.23 The boundary of the SPA is coincident with that of the Hermaness SSSI, Saxa Vord SSSI, and Valla Field SSSI. The seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface.

4.24 Part of the site (Hermaness SSSI and Saxa Vord SSSI) was previously classified as Hermaness and Saxa Vord SPA on 29 March 1994 for Northern fulmar *Fulmarus glacialis*, Northern gannet *Morus bassana*, great skua *Catharacta skua*, common guillemot *Uria aalge* and Atlantic puffin *Fratercula Arctica*.

Qualifying Features

4.25 Hermaness, Saxa Vord and Valla Field SPA qualifies under Article 4.1 by regularly supporting populations of European importance of the Annex I species red-throated diver (average of 26 proven breeding pairs for 1994 - 1999, 3% of the British breeding population).

4.26 Hermaness, Saxa Vord and Valla Field SPA also qualifies under Article 4.2 by regularly supporting populations of European importance of the migratory species; Northern gannet (16,400 pairs in 1999, 8% of the British and 6% of the world population), great skua (788 pairs in 1997, 9% of the British and 6% of the world population) and Atlantic puffin (55,000 individuals in 1999, 6% of the British and 3% of the total population of the sub-species *F. a. grabae*).

[10] Source: https://www.environment.gov.scot/data/data-analysis/protected-nature-sites/?pagenumber=1&resetmap=true&siteid=8498, accessed 24 January 2019

4.27 Hermaness, Saxa Vord and Valla Field SPA qualifies further under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds. It regularly support 157,500 seabirds including nationally important populations of the following species: Northern fulmar (19,539 pairs in 1999; 4% of the GB population), European shag *Phalacrocorax aristotelis* (450 pairs in censuses in 1995 and 1999; 1% of the GB population), common guillemot (25,000 individuals over two surveys carried out in 1996 and 1999; 2% of the GB population) and blacklegged kittiwake *Rissa tridactyla* (922 pairs in 1999; 0.2% of the GB population).

Conservation Objectives – qualifying species

4.28 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

4.29 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

Condition assessment

4.30 Scottish Natural Heritage has published information about the condition of the qualifying features of the Hermaness, Saxa Vord and Valla Field SPA[11] and these are summarised below.

4.31 The condition of the SPA was last assessed on 28 June 2017 for some qualifying features but some features were last assessed before this, the oldest assessment being for great skua in 2013. The assessment has concluded that 33% of the SPA is in favourable condition, 33% is described as unfavourable recovering and 33% as unfavourable. With regard to the individual qualifying features, the following species are described as being in favourable condition: fulmar, gannet and great skua. The following qualifying features are described as being in unfavourable condition: guillemot, kittiwake, puffin, red-throated diver, shag and the seabird assemblage.

[11] Source: https://www.environment.gov.scot/data/data-analysis/protected-nature-sites/?pagenumber=1&resetmap=true&siteid=8512, accessed 24 January 2019

5 Underlying trends

Site conditions

5.1 The Site is located in the north-west of Yell on open moorland that ranges in elevation from sea level to 112m (on the Hill of Vigon). Wind speeds and rainfall are high across the island, but temperatures are moderate. As a result, the vegetation is upland in character, waterlogged and dominated by blanket bog and other mire types, with areas of grassland in the more sheltered valleys and on better-drained slopes.

5.2 Sheep graze the majority of the site and this land use is likely to represent the main impact on vegetation as the area is isolated from areas where development has previously taken place. In the absence of further development it is likely that the habitats within the Site will remain unchanged. It is assumed that in the absence of development, livestock grazing will continue at a similar stocking density to the current grazing regime, and this will contribute to the maintenance of the existing habitats.

5.3 It is also concluded that, in the absence of any development, surface water storage within blanket bog and other mire habitats within the Site and run-off from the Site will remain unchanged (although climate change may affect weather patterns – see below).

Climate change

5.4 It is now widely accepted that the climate is changing as a result of anthropogenic influence, but the nature and magnitude of the resultant changes are difficult to predict (see for example ASC, 2016). Nevertheless, there is increasing evidence that climate change in the UK will result in increasingly warm dry summers and mild, stormy winters along with rising sea levels. These changes may, in turn, result in impacts on European sites.

5.5 Climate change has the potential to result in a wide range of effects including surface water erosion, fluvial flooding, and changes in species distribution. In the context of the Proposed Development Site, changes in rainfall and the regularity of storm events could result in effects on the flow in watercourses that cross the Site, which may in turn result in changes in the freshwater inputs to the marine environment.

5.6 It is considered unlikely that climate change will affect how the designated features of Bluemull and Colgrave Sounds pSPA, Otterswick and Graveland SPA, Fetlar SPA, Hermaness and Saxa Vord and Valla Field SPA will use the habitats within and near the Site during the operational life of the Proposed Development (30 years).

Noise / vibration

5.7 The existing Site is likely to generate very low levels of noise and vibration associated with the day-to-day management of the land for grazing purposes. In the absence of the Proposed Development it is expected that noise and vibration would be maintained at a low level.

Air Quality

5.8 Air quality data have been obtained for the East Mires and Lumbister SAC[12] (which is 2.0 km to the south of the Site) from the Air Pollution Information System (http://www.apis.ac.uk/, accessed 20 March 2019): APIS currently uses background pollution maps based on a 3-year average for 2013-2015. In Table 3 the maximum, minimum and average concentrations are presented for the whole SAC, which provides an indication of current pollutant loadings.

[12] This site has been used as it supports similar habitats to those recorded within the development site.

5.9 APIS provides a critical load for N deposition of 5-10 kg N/ha/yr and therefore the site values presented in Table 3 fall within this critical load range. Source attribution information, however, indicates that 35% of nitrogen is derived from livestock, 31% is of non-agricultural non-abatable origin, and 16% is derived from European sources.

5.10 A critical level of 1 µg NH_3 m^3 is provided for blanket bog and the reported site values fall well below this. The same is also the case for NOx where the critical level is 30 µg NOx/m^3 annual mean for blanket bog, and SO_2 where the critical level is 10 µg SO_2/m^3 annual mean.

Table 3: Air quality data for the East Mires and Lumbister SAC

Pollutant	Units	Maximum	Minimum	Average
N deposition	Kg N/ha/yr	9.94	8.26	8.62
Acid deposition	N/S Keq/ha/yr	0.71 / 0.2	0.59 / 0.17	0.62 / 0.18
NH_3	µg/m^3	0.1	0.07	0.08
NOx	µg/m^3	4.74	4.49	4.55
SO_2	µg/m^3	0.07	0.07	0.07

Summary

5.11 In the absence of any development it is considered that the habitats within the development site will remain unchanged, i.e. upland habitats that are grazed by livestock. Similarly noise / vibration and air quality at the Proposed Development Site is, in the absence of the development, unlikely to change significantly from the current conditions.

5.12 It is possible that, in the absence of any development, climate change could result in changes to the rainfall within the development site, which in turn may have an effect on the habitats (some of which are highly dependent on aerial deposition).

6 Stage 1: Identification of Likely Significant Effects

Evaluation of Effects

6.1 Regulation 63 of the Habitats Regulations requires that the Proposed Development is assessed to determine whether or not it is likely to have a significant effect on the qualifying features (species and habitats) of any European site, either alone or in combination with other plans or projects. This assessment has considered the different stages of the Proposed Development, i.e. construction, operation and decommissioning.

6.2 A recent HRA judgment (People Over Wind and Sweetman, 12 April 2018, C-323/17) means that avoidance or reduction measures cannot be relied upon to allow a conclusion of 'no likely significant effect' to be reached to avoid undertaking an appropriate assessment. Instead it is necessary to consider whether there is a 'likely significant effect' in the absence of these measures, and move to the next stage, i.e. appropriate assessment, at which point such mitigation measures can be considered. This requirement has been considered within this assessment of likely significant effects.

6.3 A second recent HRA judgment (Holohan & Ors. v An Bord Pleanála, 7 November 2018, C - 461/17) has also been considered within this assessment. In summary this judgment provides further clarification about the scope of an assessment, requiring that habitats and species associated with a European site but which are not qualifying features must nevertheless be considered if impacts on those non-qualifying habitats and species are liable to affect the conservation objectives of the site.

The role of the land at the development site as 'functionally linked land'

6.4 A development has the potential to impact on a European site either directly, for example as a result of land-take, or indirectly, for example as a result of air pollution. When assessing impacts it is important to note that impacts need to be considered on 'functionally linked land'. Functionally linked land can be defined as follows (Chapman & Tyldesley, 2016):

'*the term 'functional linkage' refers to the role or 'function' that land or sea beyond the boundary of a European site might fulfil in terms of ecologically supporting the populations for which the site was designated or classified. Such land is therefore 'linked' to the European site in question because it provides an important role in maintaining or restoring the population of qualifying species at favourable conservation status*.'

6.5 In this report consideration has been given to whether or not the development site includes land that is functionally linked to the following sites:

- Bluemull and Colgrave Sounds pSPA, which is 0.3 km to the south-east of the development site boundary and which supports breeding red-throated diver;
- Otterswick and Graveland SPA, which is 3 km to the south-west and which supports breeding red-throated diver;
- Fetlar SPA, which is 3.9 km to the south-east and which supports whimbrel (breeding), red-necked phalarope (breeding), great skua (breeding), fulmar (breeding), dunlin (breeding), Arctic tern (breeding), Arctic skua (breeding) and a breeding seabird assemblage;
- Hermaness, Saxa Vord and Valla Field SPA, which is 6.1 km north-east and which supports fulmar (breeding), gannet (breeding), great skua (breeding), guillemot (breeding), kittiwake (breeding), puffin (breeding), red-throated diver (breeding), shag (breeding) and a breeding seabird assemblage.

6.6 It is possible that many of the qualifying species associated with these European sites may move beyond the boundary of the designated site and utilise land within the Proposed Development Site. In the following sections the qualifying species recorded within the Proposed Development Site are considered, with consideration given to whether or not the development Site includes functionally linked land. Reference is made to desk study and survey data collected during the period 2016 to 2018 (Energy Isles Wind Farm EIA Report, Chapter 6 Ornithology, Section 6.6.42 et seq).

Divers

Red-throated diver

6.7 Red-throated diver was frequently recorded throughout the Site, both from vantage point surveys and during the breeding bird walkover surveys. The red-throated diver survey area and VP locations are shown on Figure 2, Section 11.

6.8 The breeding bird survey work resulted in 4 confirmed pairs of breeding red-throated diver within the Site (all in 2018 – none were recorded in 2016).

6.9 SBRC provided 140 records for red-throated diver from within 10 km of the Site since 1994 (82 records since 2006). Records included pairs within the Site (13 from 1994 and 5 from 2006), with breeding confirmed for all but one record.

6.10 The Otterswick and Graveland SPA and Hermaness, Saxa Vord and Valla Field SPA (located approximately 3 km south-west and 6.1 km north-east of the Site respectively) are classified for their breeding populations of red-throated diver. The Bluemull and Colgrave Sounds pSPA has been selected as an important foraging area for breeding red-throated diver.

Waders

Whimbrel

6.11 Whimbrel was recorded during VP survey work in May and July 2016 and in August 2018.

6.12 Three breeding territories (one in 2016 and two in 2018) were recorded at the Lochs of Lumbister approximately 2 km south of the Site during the breeding bird survey work.

6.13 SBRC returned 51 records for whimbrel within 10 km of the Site since 1992. All records relate to breeding pairs or apparently occupied territories. One apparently occupied territory record was reported from within the Site boundary (located in the north-west corner of the Site) dated 2002.

6.14 Whimbrel is a qualifying feature of the Fetlar SPA (supporting 65 pairs; <0.1 % of the International population). The SPA is 3.9 km south-east of the Site.

Dunlin

6.15 Dunlin was only recorded during the breeding season. Breeding bird walkover survey work recorded a maximum of 67 dunlin breeding territories in 2016 and 82 in 2018 within the survey area. Of these, 32 (in 2016) and 41 (in 2018) were recorded within the Site.

6.16 SBRC returned 193 records of dunlin within 10 km of the Site since 1993. One count of an apparently occupied territory was returned from within the Site boundary (recorded in July 2009).

6.17 Dunlin is a classification feature of the Fetlar SPA (approximately 3.9 km south-east of the Site) which supports 90 breeding pairs (1 % of the UK population).

Skuas and Gulls

Great Skua

6.18 Great skua was recorded commonly during the VP surveys between April and October.

6.19 Flights were recorded throughout the Survey Area, with the highest concentrations of activity noted at Hill of Bakkanalee in the northern part of the Site and the Lochs of Lumbister to the south of the Site.

6.20 A total of 91 apparent occupied territories were recorded during the 2018 breeding bird walkover survey, with 46 territories occurring within the Site.

6.21 SBRC returned 92 records for great skua within 10 km of the Site since 2002. Ninety-one of the records were for counts of apparently occupied territories, and one record was for eight roosting birds. The largest count was recorded within the Site boundary, on the west side of the Site (23 counts of apparently occupied territories in May 2002; twenty-one apparent occupied territories were recorded at this location again in June 2017).

6.22 Great skua is a feature of the Fetlar SPA (3.9 km distant from the Site) and Hermaness, Saxa Vord and Valla Field SPA (6.1 km distant from the Site), which support 512 pairs (3.8 % of the World population) and 630 pairs (4 % of the World breeding population) respectively.

Arctic Skua

6.23 Arctic skua was frequently recorded during VP survey work and breeding bird walkover surveys between May and August in both 2016 and 2018.

6.24 A total of 16 territories were recorded during surveys in 2018, with 3 occurring within the Site.

6.25 SBRC returned 130 records of Arctic skua from within 10 km of the Site since 1999. Twenty records were returned from within the Site boundary (eighteen counts in May 2002, one count in June 2002 and one count in June 2017).

6.26 Arctic skua is a feature of the Fetlar SPA (3.9 km distant from the Site) forming part of the seabird assemblage of international importance (22,000 individuals).

Arctic Tern

6.27 Arctic tern was frequently recorded during VP work and breeding bird walkover surveys between May and August in both 2016 and 2018.

6.28 Five breeding colonies were recorded during the breeding bird walkover survey in 2016, all beyond the Site boundary.

6.29 In 2018 a total of seven breeding colonies were recorded along the coastline west of the Site, four of which were within 500 m of the Site boundary (none were present within the Site).

6.30 Twenty-eight records of Arctic tern were returned by SBRC from within 10 km of the Site since 1999. One record was returned from within the Site boundary (at the edge of the north-west corner of the Site) and related to an individual flushed in June 2000.

6.31 Arctic tern is a feature of the Fetlar SPA (3.9 km distant from the Site), which supports 520 pairs representing at least 1.2% of the breeding population in Great Britain (three year mean, 1994-1997).

Fulmar

6.32 Fulmar was recorded flying across the Site during the VP survey work.

6.33 Fulmar territories were confined to the coastal cliffs to the north and west of the Site. No evidence of breeding activity was recorded within the Site and moorland habitats within the Survey Area.

6.34 SBRC returned twenty-three records for fulmar within 10 km of the Site centre since 1999. None of the records were from within the Site.

6.35 Fulmar is a qualifying feature of the Fetlar SPA and Hermaness, Saxa Vord and Valla Field SPA, in both cases forming part of the seabird assemblage of international importance (22,000 and 52,000 individuals respectively).

Qualifying features not recorded within the Site

6.36 Data provided by SBRC and the results of surveys carried out in 2016 and 2018 did not identify the following SPA qualifying features within the Site: red-necked phalarope, gannet, puffin, guillemot, kittiwake and shag. Consequently these species have not been considered within the assessment.

Assessment of functionally linked land

6.37 For the purposes of the Stage 1 'screening' assessment of likely significant effects, the results of the desk study and survey work have been examined to determine whether the qualifying species of any European site use the Site. This has identified a number of qualifying species that either breed within or commute over the Site: red-throated diver (breeding and commuting); whimbrel (commuting); dunlin (breeding); great skua (breeding and commuting); Arctic skua (breeding and commuting); Arctic tern (commuting); and fulmar (commuting).

6.38 In the absence of detailed analysis it is possible that these birds form part of or are linked to populations associated with Otterswick and Graveland SPA, Hermaness, Saxa Vord and Valla Field SPA, Fetlar SPA and Bluemull and Colgrave Sounds pSPA. Applying the precautionary approach, it has been assumed (for the purposes of the Stage 1 'screening' assessment) that parts of the Site could be functionally linked to one or more of these European sites, i.e. the land at the Site may provide an important role in maintaining or restoring the population of qualifying species at favourable conservation status or indeed of (in view of the judgment in C-461/17) any non-qualifying habitats or species which are necessary for the conservation of the qualifying species) to the European sites listed above.

Management of European sites

6.39 Regulation 63 of The Conservation of Habitats and SpeciesRegulations 2010 requires that a competent authority, before deciding to give permission for a project, should first determine whether the project is directly connected with or necessary to the management of a European site. In this case the Proposed Development is a construction project that is not directly connected with or necessary to the management of Otterswick and Graveland SPA, Hermaness, Saxa Vord and Valla Field SPA, Fetlar SPA, Bluemull and Colgrave Sounds pSPA and East Mires and Lumbister SAC.

Impact mechanisms

6.40 In Section 3 the following potential impact mechanisms were identified:

- Habitat loss and disturbance
- Noise / vibration related disturbance
- Visual disturbance
- Increased mortality

6.41 In the following sections each of these mechanisms is considered with reference to the construction, operation and decommissioning phases of the Proposed Development.

Habitat loss and habitat disturbance

Construction Phase

6.42 As no parts of the Proposed Development fall within the boundary of a European site no direct habitat loss is possible. Indirect impacts on habitats within European sites are also unlikely due to the separation distance from the nearest wind farm infrastructure. The nearest European site is Bluemull and Colgrave Sounds pSPA, which is 0.3 km to the south-east of the nearest borrow pit and access track. The construction of the wind farm is not likely to impact on the pSPA, which is a marine site.

6.43 It is possible that land within the Proposed Development Site could be functionally linked to a European site (see paragraphs 6.37-6.38), i.e. the land is used by the qualifying features of a SPA. If this is the case then construction work within the Proposed Development could impact indirectly on the qualifying features of a European site, i.e. as a result of noise and visual disturbance. Whilst habitat loss during the construction phase has not been taken through to the appropriate assessment, impacts on qualifying species using functionally linked land are considered with respect to noise and visual disturbance.

Operation Phase

6.44 All habitat loss and habitat disturbance will take place during the construction phase with no further loss or disturbance anticipated during the operation phase, although some longer-term changes of peatland habitats may occur due to changes in the hydrological conditions immediately adjacent to the Proposed Development infrastructure (Energy Isles Wind Farm EIA Report, Chapter 7 Ecology, Section 7.10.18 et seq). Consequently impacts on the qualifying features of a European site are not considered likely during the operation phase as a result of habitat loss or disturbance. Habitat loss during the operation phase has not been taken through to the appropriate assessment.

Decommissioning Phase

6.45 Decommissioning phase impacts are generally regarded as similar to those experienced during the construction phase, albeit less intrusive (Energy Isles Wind Farm EIA Report, Chapter 7 Ecology, Section 7.10.25). Habitat loss during the decommissioning phase has not been taken through to the appropriate assessment.

Noise / vibration / visual related disturbance

Construction Phase

6.46 Noise and vibration arising during the construction phase of the Proposed Development is not predicted to extend as far as the nearest European site (Bluemull and Colgrave Sounds pSPA, which is 0.3 km to the south-east of the southern boundary of the site). As the nearest wind turbine and associated infrastructure is more than 1 km from the pSPA it is unlikely that birds within the pSPA will be affected by noise and vibration arising from the Proposed Development (Energy Isles Wind Farm EIA Report, Chapter 8 Noise, Section 8.6 & Table 8.16). As noted above, it is possible, however, that land within the Proposed Development Site could be functionally linked to a European site (see paragraphs 6.37-6.38), and therefore direct impacts on these habitats could impact indirectly on the qualifying features of a European site. The same rational is also relevant when considering visual effects on qualifying features.

Operation Phase

6.47 Effects of land take (i.e. decreased resource availability) on birds are likely to be low given the small percentage (2.9 %) of the Site that will be occupied by the footprint of the Proposed Development (48.6 ha). There is the potential for a particular component of the Proposed Development infrastructure to be sited on, or close to, a specific type and area of habitat used by one or more qualifying features (birds) of a European site. Whilst disturbance effects may occur, it is expected that there is scope for the displacement of birds without affecting the conservation status at the local level.

6.48 A range of studies have concluded that most bird species are not significantly affected by operational wind farms (e.g. Vauk, 1990; Phillips, 1994; Percival, 2005, 2000 Devereux *et al* 2008; Winkelmann, 1994; Langston & Pullan, 2003; Hotker *et al,* 2006). In the context of the Site, those species that are most susceptible are likely to be those that have a low tolerance to disturbance (such as red-throated diver).

Decommissioning Phase

6.49 Decommissioning phase impacts are generally regarded as similar to those experienced during the construction phase, albeit less intrusive (Energy Isles Wind Farm EIA Report, Chapter 7 Ecology, Section 7.10.25).

Increased mortality

Construction Phase

6.50 The Proposed Development has the potential to result in increased mortality of qualifying features (birds) of Bluemull and Colgrave Sounds pSPA, Otterswick and Graveland SPA, Fetlar SPA, Hermaness and Saxa Vord and Valla Field SPA. In the absence of mitigation, birds could be injured or killed as a result of the construction work if they are present in areas that will be directly impacted during this phase of the development (for example, whilst nesting adult birds may abandon a nest, chicks may be at risk of being killed or injured).

Operation Phase

6.51 Birds that use the airspace within the Site are at risk of collision with turbine blades, although the magnitude of the risk will depend on the extent to which birds are displaced, and their ability to detect and manoeuvre around rotating turbine blades. Birds that collide with blades are likely to be killed or fatally injured (Energy Isles Wind Farm EIA Report, Chapter 6 Ornithology, Section 6.7.85 et seq).

6.52 Survey has identified a number of qualifying features (birds) that either breed within or commute over the Site: red-throated diver (breeding and commuting); whimbrel (commuting); dunlin (breeding); great skua (breeding and commuting); Arctic skua (breeding and commuting); Arctic tern (commuting); and fulmar (commuting) (see Section 6.8 et seq). It therefore follows that, in the absence of detailed analysis, there is the potential for these birds to collide with rotating turbine blades.

Decommissioning Phase

6.53 The effects of decommissioning have the potential to be similar to those during the construction phase but are likely to occur over a shorter time period (Energy Isles Wind Farm EIA Report, Chapter 6 Ornithology, Section 6.7.136 et seq).

6.54 In the absence of any significant residual hydrological effects (Energy Isles Wind Farm EIA Report, Chapter 10: Geology, Peat, Hydrology & Hydrogeology, Section 10.7.64) there are unlikely to be any effects on protected sites at the time of decommissioning. Breeding and foraging habitats that are lost during the construction phase will be allowed to regenerate to a condition representative of the pre-development baseline, and turbine foundations may be left in situ but will be buried with top-soil to allow colonisation of vegetation present within the surrounding area.

6.55 Species at greatest risk of being killed or injured within the Site during decommissioning are those that breed within it at that time.

Summary

6.56 In summary, the land at the development Site does not include any parts of a European site and the Proposed Development is not directly connected with or necessary to the management of any European site.

6.57 In the absence of detailed analysis, the presence of birds within the Site that are qualifying features of Bluemull and Colgrave Sounds pSPA, Otterswick and Graveland SPA, Fetlar SPA, Hermaness and Saxa Vord and Valla Field SPA, has led to the precautionary assumption that land within the Site may be functionally linked to a European site. This is a precautionary evaluation that has been carried out for the purposes of the Stage 1 'screening' assessment.

6.58 In the absence of avoidance and reduction measures it is not possible to discount the possibility that the Proposed Development alone could have a significant effect on:

- Bluemull and Colgrave Sounds pSPA;
- Otterswick and Graveland SPA;
- Fetlar SPA; and
- Hermaness and Saxa Vord and Valla Field SPA.

6.59 It cannot be discounted that the Proposed Development is likely to have a significant effect on the European sites listed above through a combination of one or more of the following pathways:

- Noise, vibration or visual disturbance of qualifying species using the Site;
- Increased mortality of qualifying species using the Site.

6.60 East Mires and Lumbister SAC is located 2 km to the south of the Site and no mechanisms have been identified whereby the SAC could be impacted during the construction, operation and decommissioning phases of the Proposed Development. For this reason it has been scoped out of the assessment.

6.61 This conclusion has been reached by considering the Proposed Development alone and therefore an 'in combination' assessment has not been necessary as part of the screening process. There are no other impacts from the project which alone are likely to have a significant effect and there are no other impacts which are likely to have a significant effect when considered in combination with other plans and projects.

7 Stage 2: Appropriate Assessment

Introduction

7.1 It cannot be discounted that the Proposed Development is likely to have a significant effect on the Bluemull and Colgrave Sounds pSPA, Otterswick and Graveland SPA, Fetlar SPA, and Hermaness and Saxa Vord and Valla Field SPA. This conclusion for screening purposes is reached in the absence of any consideration of mitigation. Consequently the requirement to complete an appropriate assessment is triggered, which considers the effects of the Proposed Development on the integrity of these European sites. Where potential adverse effects are identified, this part of the assessment needs to consider measures to mitigate the identified effects.

7.2 In the following sections potential impacts and their effects are evaluated and appropriate mitigation measures considered when determining whether the Proposed Development may have an adverse effect on the integrity of any European site. Impacts are considered for the construction, operation and decommissioning phases of the Proposed Development.

7.3 The assessment presented below also considers impacts on all habitats and species associated with a European site (irrespective of whether or not they are qualifying features) if impacts on those habitats and species are liable to affect the conservation objectives of the site, i.e. if those habitats and species are necessary to the conservation of the habitat types and species listed for the protected area (see Holohan & Ors. v An Bord Pleanála, 7 November 2018, C - 461/17). In the context of this assessment no such habitats and species have been identified.

The role of the land at the development site as 'functionally linked land'

7.4 As previously noted, development has the potential to impact on a European site indirectly as a result of impacts on 'functionally linked land' (see paragraphs 6.4 and 6.5). During the Stage 1 'screening' assessment for likely significant effects, it was noted that, in the absence of detailed analysis, the presence of birds within the Site that are qualifying features of Bluemull and Colgrave Sounds pSPA, Otterswick and Graveland SPA, Fetlar SPA, Hermaness and Saxa Vord and Valla Field SPA, has led to the precautionary assumption that land within the Site may be functionally linked to a European site. This is a precautionary evaluation that is examined in more detail in the following sections.

7.5 Consideration has been given to whether or not the Site includes land that is functionally linked to the following European sites:

- Bluemull and Colgrave Sounds pSPA, which is 0.3 km to the south-east of the development site boundary and which supports breeding red-throated diver;
- Otterswick and Graveland SPA, which is 3 km to the south-west and which supports breeding red-throated diver;
- Fetlar SPA, which is 3.9 km to the south-east and which supports whimbrel (breeding), red-necked phalarope (breeding), great skua (breeding), fulmar (breeding), dunlin (breeding), Arctic tern (breeding), Arctic skua (breeding) and a breeding seabird assemblage;
- Hermaness, Saxa Vord and Valla Field SPA, which is 6.1 km north-east and which supports fulmar (breeding), gannet (breeding), great skua (breeding), guillemot (breeding), kittiwake (breeding), puffin (breeding), red-throated diver (breeding), shag (breeding) and a breeding seabird assemblage.

7.6 In the following sections those qualifying species recorded within the Site are considered. Reference is made to survey data collected during the period 2016 to 2018 (Energy Isles Wind Farm EIA Report, Chapter 6 Ornithology, Section 6.6.42 et seq) with the objective of determining how birds are using the Site and what their relationship is with the European sites listed in paragraph 7.5.

Divers

Red-throated diver

7.7 Red-throated diver was frequently recorded throughout the Site, with a total of 417 flight lines (totalling 669 flights by individuals) recorded during VP survey work: all flights were recorded between 05 April 2016 to 01 September 2016, and 30 March 2018 to 24 August 2018. Red-throated diver flight lines are presented in Figure 4, Section 11.

7.8 A further 16 red-throated diver flight lines were recorded during the red-throated diver VP survey work (overlooking the Otterswick and Graveland SPA). Two birds were recorded heading north from the Whale Firth approximately 500 m east of the SPA boundary on 11 August 2016; however, it was not possible to confirm where they were flying to. No other flights by red-throated diver were observed to head toward, or appear to originate from, the Site.

7.9 Eight flights were made by birds moving between the Whale Firth and the Otterswick and Graveland SPA; one flight was made by two birds heading west into Yell Sound from the SPA; and six flights were of birds making short flights entirely within the SPA. Flight lines recorded during the red-throated diver VP survey are presented in Figure 6, Section 11.

7.10 Breeding red-throated diver survey work undertaken between May-August 2018 recorded a total of 258 flight lines (425 individuals). Activity levels were greatest around Gossa Water and surrounding lochans in the south-western part of the Site (118 flights), around the Knowe of Houllanginga and Mare's Pool in the north-western part of the Site (106 flights), and in the vicinity of Kussa Waters immediately beyond the north-eastern boundary of the Site (32 flights).

7.11 The breeding red-throated diver survey work recorded approximately 30 flights that appeared to originate from or head towards the Basta Voe section of the Bluemull and Colgrave Sounds pSPA. One flight was recorded heading south from the Burn of Gossawater within the Site and continuing into Basta Voe on 19 June 2018. An additional 77 flights recorded during VP survey work were of birds moving between the Site, or areas adjacent to it, and Basta Voe.

7.12 The majority of birds flying from lochans on Flonga Field in the northern part of the Site were observed to head north onto Gloup Voe; those flying from Fulga Water and Grud Water in the southern part of the Site, and from lochans at the Hill of Vigeon and Hill of Houllanginga in the western part of the Site typically flew west to foraging waters west of Yell. Flight lines recorded during the breeding diver survey work are presented in Figure 5, Section 11.

7.13 The breeding diver survey work resulted in 10 confirmed breeding pairs of red-throated diver in 2016 and 11 in 2018 (noted either with young or positively identified nest sites). Of these, four confirmed breeding pairs were recorded within the Site in 2018 (no confirmed breeding pairs were recorded in 2016). An additional 20 possible/probable diver territories (not confirmed breeding) were recorded within the Survey Area in 2016 (3 within the Site) and 13 recorded in 2018 (2 within the Site). One bird was recorded at Gloup Voe immediately beyond the northern boundary of the Site during a winter walkover survey visit in early November 2017. The locations of confirmed and unconfirmed breeding red-throated diver are presented in Figure 18, Section 11 (confidential figure).

7.14 The Shetland Biological Records Centre (SBRC) provided 140 records for red-throated diver from within 10 km of the Site since 1994 (82 records since 2006). All of the records except for two are for a single pair of birds (the other two are for two pairs of birds). Records included 18 pairs within the Site (13 from 1994 and 5 from 2006), with breeding confirmed for all but one record. Twenty-six further records were returned within 2 km of the Site between 1995 and 2017. These included: twenty records for breeding pairs, two records of pairs probably breeding and four records for pairs possibly breeding.

7.15 The population of breeding red-throated diver in the Shetland Natural Heritage Zone (NHZ), which supports the highest density of breeding red-throated divers in the UK (33%) (Balmer *et al,* 2013), is approximately 407 pairs (Wilson *et al,* 2015). Red-throated diver is also a Shetland Local Biodiversity Action Plan (LBAP) species. The species action plan states the current limiting factors on the Shetland population as: disturbance, predation, loch size, egg collectors, dropping water levels and lack of food supply.

7.16 Survey work on the Shetland population in 1983 indicated a population of 700 pairs (Gomersall *et al,* 1984), with declines noted by further surveys in 1994 with an estimate of 424 pairs (Gibbons *et al,* 1997). The largest declines during this period were observed on Yell (72 pairs, 52 %), with South Mainland and Fetlar showing stable numbers. However, Pennington *et al* (2004) indicates that increases in productivity have been observed on Yell between 1981 and 2000 (using Shetland Bird Ringing Club data), and a general trend of increasing breeding success noted on all monitored Shetland islands between 2007 and 2016 (SBC, 2018). Dillon *et al* (2009) suggest that the apparent decline of the Shetland breeding population observed since the 1983 estimate could reflect natural fluctuation in breeding activities between years, and is within the margin of error in the detection of breeding attempts by surveyors.

7.17 National surveys completed in 2006 recorded a higher number of individual adults and lochs occupied on Shetland than in the 1994 surveys, indicating an overall increase in the population (Dillon *et al,* 2009). Increases in the number of breeding pairs were recorded on the Outer and Inner Hebrides (139.2 % and 143.8 % respectively), and on mainland Scotland (14.4 %) between the 1994 and 2006 surveys, giving an overall increase in the UK breeding population of 33.7 %. Despite these reported increases, more recent studies by Okill (2017) and O'Brien *et al* (2018) have reported poor breeding seasons and a decline in recent breeding success in all Northern Isles. The Conservation Status of red-throated diver in Shetland is therefore uncertain.

7.18 The Otterswick and Graveland SPA and Hermaness, Saxa Vord and Valla Field SPA (located approximately 3 km south-west and 6.1 km north-east of the Site respectively) are classified for their breeding populations of red-throated diver. The SPA descriptions for these Sites states that the Otterswick and Graveland SPA supports 27 pairs representing at least 2.9% of the breeding population in Great Britain (1994-1996); and Hermaness, Saxa Vord and Valla Field SPA supports 28 pairs representing at least 3.0% of the breeding population in Great Britain (1994-1996).

7.19 Red-throated divers have been shown to exhibit strong breeding site fidelity. Okill (1992) demonstrated that the majority of birds return to the same loch to breed, and those that did not were found on the nearest suitable breeding loch (greatest distance of 1.05 km, closest 0.11 km of a sample of 24 birds). Dispersal of birds from their natal loch was found to be far greater in females than in males, with females dispersing up to 68 km and males up to 4.4 km (Okill, 1992).

7.20 Recruitment of immature / 1st year birds to and from the SPA populations is therefore likely to occur. However, interchange between the Site and SPA populations is likely to be relatively weak, and probably restricted to female birds. Stroud *et al* (2001) suggests that the populations of breeding red-throated diver within the Otterswick and Graveland SPA and Hermaness, Saxa Vord and Valla Field SPA are 27 and 28 pairs respectively. Taking a mean success of nests within monitored areas on Shetland between 2007 and 2016 (reported in SBC, 2018) as 0.58, the SPA birds will fledge approximately 31.9 birds per year, of which approximately half (16 birds) will be female.

7.21 Dillon *et al,* (2009) indicate that 600 lochs were occupied by red-throated diver in Shetland during the 2006 National survey; on this basis, 1 bird from the SPA populations may be recruited into each one of 600 lochs in Shetland once in every 37.5 years[13]. This assumes that all lochs within Shetland are recruited to equally, that all fledged birds survive to breeding age and all return to Shetland which, of course, will not be the case. However, it does demonstrate the low likely functional linkage between the Site and SPA populations.

[13] If the SPA produces an average of 16 females per year (discounting males due to their low maximum recorded movement from natal sites) then an average of 1 female will be recruited into each of 600 lochs on Shetland every 37.5 years.

7.22 In addition, the red-throated diver VP survey work did not record regular flights between the Site and the Otterswick and Graveland SPA and, following review of this data, SNH have agreed (in their scoping response dated 15 December 2017; Energy Isles Wind Farm EIA Report, Chapter 6 Ornithology, Section 6.4.3) that no impacts on the SPA are likely.

7.23 Further interchange of adult birds is unlikely (due to the species' tendency for site fidelity) and so the degree of functional linkage between the Site and SPA populations is likely to be low.

7.24 The Bluemull and Colgrave Sounds pSPA has been selected as an important foraging area for breeding red-throated diver, falling within the foraging range of a high concentration of nesting birds in Yell and South Unst. Survey work in 2016 and 2018 recorded birds moving between the Site and the Bluemull and Colgrave Sounds pSPA, indicating that the population breeding within the Site use the airspace over the pSPA, and forage within it. This supports survey work conducted by Black *et al* (2015) to inform selection of the pSPA, which recorded birds flying from north Yell to forage in Bluemull and Colgrave Sounds. Further radio tracking studies conducted by Black *et al* (2015) on mainland Shetland indicate that red-throated diver undertake regular foraging trips of up to 9 km form the nest site during the breeding season. Given this, red-throated divers breeding within the Site may be within foraging flight range of all parts of the pSPA.

7.25 Despite the lack of a distinct linkage between the population within the Site and the Otterswick and Graveland SPA or Hermaness, Saxa Vord and Valla Field SPA, birds within the Site are likely to use the Bluemull and Colgrave Sounds pSPA and, therefore, the population within the Site can be considered to form part of the pSPA population. SNH (2016b) indicates that the pSPA potentially supports the food supplies of up to 194 pairs of birds. As noted above, 4 confirmed breeding pairs were recorded within the Site in 2018 (no confirmed breeding pairs were recorded in 2016) and an additional 2 possible/probable diver territories were recorded within the Site in 2018 (giving a total of 6 pairs). This represents 3.1% of the pSPA population.

7.26 It is concluded that land within the Site may be functionally linked to the pSPA for red-throated diver as it provides an important role in maintaining or restoring the population of qualifying species at favourable conservation status. The land within the Site is not considered to be functionally linked to the Otterswick and Graveland SPA or the Hermaness, Saxa Vord and Valla Field SPA.

7.27 The assessment has considered whether the habitats within the Site are necessary to the conservation of red-throated diver using the Bluemull and Colgrave Sounds pSPA (see Holohan & Ors. v An Bord Pleanála, 7 November 2018, C - 461/17). In the context of this assessment it is concluded that lochans used for breeding are not important for the conservation of red-throated diver using the pSPA. The reason for this is that survey data collected in 2018 show that the red-throated diver that were breeding within the Site mostly flew north or west rather than south to the pSPA. Notwithstanding this, the proposed development will have a very small impact on lochans, the majority of which will be retained.

Waders

Whimbrel

7.28 Whimbrel was recorded during VP survey work in May and July 2016 and in August 2018. Thirteen flight lines (involving a total of 69 individuals) were recorded, with peak counts of 14 and 21 birds noted on 03 August 2018. Whimbrel flight lines recorded during VP survey work are presented in Figure 7, Section 11.

7.29 Three breeding territories (one in 2016 and two in 2018) were recorded at the Lochs of Lumbister approximately 2 km south of the Site during the breeding bird survey work. Whimbrel territories recorded during breeding bird survey work are presented in Figure 19, Section 11 (confidential figure).

7.30 SBRC returned 51 records for whimbrel within 10 km of the Site since 1992. All records relate to breeding pairs or apparently occupied territories. One apparently occupied territory record was reported from within the Site boundary (located in the north-west corner of the Site) dated 2002. A further eight records are from within 2 km of the Site boundary, including records of seven breeding pairs to the north, east and south of the Site (recorded between 1992 and 2005), and one record of an apparently occupied territory (in 2002) approximately 0.2 km west of the Site.

7.31 The breeding range of whimbrel in the UK is restricted to northern Scotland, with 76% of the range confined to the Shetland Islands (Balmer *et al,* 2013). The estimated population within the Shetland NHZ is 290 pairs (more than 50 % of the UK population); however, numbers in outlying parts of mainland Shetland are likely to have been under-represented in this estimate (Wilson *et al,* 2015).

7.32 Pennington *et al* (2004) suggest that the highest densities are found on Unst and Feltar which have historically supported 106-115 pairs (Unst) and 70-81 pairs (Feltar). Yell has supported small numbers, with a peak of 39 pairs reported in the 1980's (Pennington *et al,* 2004). The UK population is declining (Richardson, 1990) and thought to be susceptible to climate change (Wilson *et al,* 2015). The Conservation Status of whimbrel is, therefore, likely to be unfavourable. However, studies of whimbrel on Shetland undertaken by Grant (1991, 1992) have shown that whimbrel nest in densities as high as elsewhere in their European range, and consistently fledged large numbers of chicks – in excess of that needed to balance adult mortality.

7.33 Whimbrel is a qualifying feature of the Fetlar SPA (supporting 65 pairs; <0.1 % of the International population). The SPA is 3.9 km south-east of the Site. Given the proximity of the Site to the SPA, it is possible that the local population recruit into the SPA population (and vice versa). However, given the low local population (as indicated through survey work and desk study data), local recruitment of SPA birds is likely to be infrequent and is not likely to be significant in maintaining the favourable conservation status of the SPA population.

7.34 In addition, adult whimbrel show a high degree of site fidelity (Grant, 1991, 1992) further limiting the likelihood of a functional linkage between the Site and the Fetlar SPA. Overall, taking into account desk study data and the results of survey, it is concluded that land within the Site is not functionally linked to the Fetlar SPA for whimbrel as it does not provide an important role in maintaining or restoring the population of the qualifying species at favourable conservation status.

Dunlin

7.35 Dunlin was only recorded during the breeding season with a total of 19 flights (24 individuals) noted during VP survey work (this total may have included passage as well as breeding birds). A total of 8 minutes and 49 seconds of flights were recorded during the VP work, 1 minute 2 seconds of which was recorded within the Collision Risk Volume over two flights (both involving single birds). Dunlin flight lines recorded during VP survey work are presented in Figure 8, Section11.

7.36 Breeding bird walkover survey work recorded a maximum of 67 (2016) and 82 (2018) dunlin territories within the survey area. Of these, 32 (in 2016) and 41 (in 2018) were recorded within the Site. Dunlin territories recorded during breeding bird survey work are presented in Figure 9, Section 11. Dunlin was not recorded during the winter walkover survey work.

7.37 SBRC provided 193 records of dunlin within 10 km of the Site since 1993. The largest count of birds was located at North Sandwick, approximately 3.4 km south east of the Site (14 counts of apparently occupied territories in 2016). One count of an apparently occupied territory was returned from within the Site boundary (recorded in July 2009). A further six records were within 2 km of the Site boundary: one count of probable breeding (recorded in 2013) near to Breckon, approximately 1 km north east of the Site, and five counts of apparently occupied territories west of Stonganess (three records in 2006 and two in 2016).

7.38 Dunlin is a common breeding summer visitor on Shetland (SBC, 2018). The estimated Shetland NHZ breeding population is 2,054 pairs (Wilson *et al,* 2015). Breeding populations in the UK are 8,600–10,600 pairs (Musgrove *et al* 2013), and in Europe are 426,000-562,000 pairs (BirdlLife International, 2004). The Conservation Status of dunlin is likely to be favourable in Shetland. However, the UK population has seen a decline of around 40 % over 25 years (between 1989/1990 and 2014/15) (Hayhow *et al,* 2017).

7.39 Dunlin is a qualifying feature of the Fetlar SPA (approximately 3.9 km south-east of the Site) which supports 90 breeding pairs (1 % of the UK population). Given the proximity of the SPA to the Site, it is possible that birds breeding within the Site and local area form part of or contribute to the SPA population. Dunlin is known to undertake considerable extended passage, and is not known to show strong breeding site fidelity (Hardy & Minton, 1980). Therefore, the Site may support birds that contribute to the maintenance of a wider population.

7.40 Given the observed contractions of the UK breeding population, and location of the Site within the core breeding range of the species, it is possible that dunlin present within the Site have a role to play in maintaining the favourable conservation status of the SPA population (for example, through immigration to populate areas where the resident birds have died). A precautionary assumption has been made that land within the Site is functionally linked to the SPA population of dunlin (i.e. it provides an important role in maintaining or restoring the population of qualifying species at favourable conservation status as defined by Chapman & Tyldesley, 2016).

7.41 The assessment has considered whether the habitats within the Site are necessary to the conservation of dunlin using the Fetlar SPA (see Holohan & Ors. v An Bord Pleanála, 7 November 2018, C - 461/17). In the context of this assessment it is concluded that the various habitats within the Site are important in terms of supporting a breeding population of dunlin; however, these habitats are widespread and so it is expected that birds will establish new nest sites elsewhere within the Site in response to disturbance and habitat loss.

Skuas and Gulls

Great skua

7.42 Great skua was recorded commonly during the VP surveys between April and October and in such large numbers that, following agreement with SNH, it was recorded as secondary species during the 2018 breeding season. A total number of 568 flight lines (680 individuals) were recorded throughout the Site between April and August 2016 and between September 2017 and March 2018.

7.43 Flights were recorded throughout the Survey Area, with highest concentrations of activity noted at Hill of Bakkanalee in the northern part of the Site and the Lochs of Lumbister to the south of the Site. Great skua flight lines recorded during the 2016 breeding season VP survey work are presented in Figure 10, Section 11. Flight lines recorded during the 2017/18 winter VP work are presented in Figure 11, Section 11.

7.44 A total of 91 apparent occupied territories were recorded during the 2018 breeding bird walkover survey, with 46 of these territories occurring within the Site. The highest concentrations were recorded on the higher elevations in the centre west of the Site near Knowe of Houllanginga, and around the Lochs of Lumbister to the south of the Site. Great skua territories recorded during the 2018 breeding bird survey work are presented in Figure 12, Section 11.

7.45 SBRC returned 92 records for great skua within 10 km of the Site since 2002. Ninety-one of the records were for counts of apparently occupied territories, and one record was for eight roosting birds. The largest count was recorded within the Site boundary, on the west side of the Site (23 counts of apparently occupied territories in May 2002). Twenty-one apparent occupied territories were recorded at this location again in June 2017.

7.46 The current population estimate for great skua within the Shetland NHZ is 10,377 apparent occupied territories, which equates to approximately 80 % of the Scottish population (Wilson *et al,* 2015) and between approximately 60 % and 63 % of the European breeding population (estimated at 16,300-17,200 pairs; BirdlLife International, 2004). An estimate of apparent occupied territories on Yell resulting from the Seabird 2000 surveys between 2000 and 2002 was 388, with highest numbers found to occur on Foula (2293), south Mainland (1455) and Unst (1385) (Pennington *et al,* 2004).

7.47 The NHZ population estimate suggests a population increase of approximately 52 % between the national Seabird 2000 survey (undertaken in 1998 - 2005) and the 2006 - 2013 Seabird Monitoring Program data. Hayhow *et al* (2017) also report an increasing UK population of 53 % over 20 years (between 1996 and 2015) (Wilson *et al,* 2015). However, despite the overall increases in range of this species in the UK, great skua remain sensitive to fluctuations in food availability, with localised population declines on Orkney between 2000 and 2010, and low productivity years reported on Shetland during the late 1980's, early 2000's and in 2011 (Balmer *et al,* 2013). The Conservation Status of great skua on Shetland is likely to be favourable.

7.48 The population of great skua breeding within the Site represents approximately 11.9 % of the Yell population (based on the 2002 population estimate), 0.4 % of the Shetland NHZ population, and 0.28 % of the European Population. A larger proportion of the European population is present locally (91 were recorded within the wider Survey Area), and these may forage within the Site.

7.49 Great skua is a feature of the Fetlar SPA (3.9 km distant from the Site) and Hermaness, Saxa Vord and Valla Field SPA (6.1 km distant from the Site), which support 512 pairs (3.8 % of the World population) and 630 pairs (4 % of the World breeding population) respectively. Great skua exhibit a strong site fidelity (Hammer *et al,* 2014), therefore, interchange of breeding adults between the Site and SPAs is likely to be limited. However, given the breeding density of great skua, both within the Site and within the SPA populations, the likelihood of recruitment of juvenile birds between sites is high.

7.50 The data presented above indicates that the population of great skua is increasing on Shetland. Given the number of birds that are present it is likely that birds will compete for any nesting opportunity that becomes available. It is therefore concluded that land within the Site is not functionally linked to either the Fetlar SPA or the Hermaness, Saxa Vord and Valla Field SPA for great skua as it does not provide an important role in maintaining or restoring the population of qualifying species at favourable conservation status within these European sites.

Arctic skua

7.51 Arctic skua was frequently recorded during VP survey work and breeding bird walkover surveys between May and August in both 2016 and 2018. A total of 116 flight lines were recorded (involving a total of 190 individuals) with a peak count of six birds recorded together twice in July 2018.

7.52 Flight activity within the Site boundary was greatest at Hill of Bakkanalee and Scordaback in the northern part of the Site, and around Fugla Field in the western part of the Site. A concentration of flight lines is also apparent around the Lochs of Lumbister approximately 2 km south of the Site. Arctic skua flight lines recorded during the VP survey work are presented in Figure 13, Section 11.

7.53 A total of 16 territories were recorded during surveys in 2018, with 3 occurring within the Site. The territories within the Site were at Hill of Markamouth (in the western part of the Site), Amfra Mires (at the centre of the Site), and near the Burn of Gossawater (near the southern boundary of the Site). Nine of the sixteen territories recorded during the work were associated with the western coastline of Yell, and four were present at the Lochs of Lumbister. The success of territories recorded was not determined. Arctic skua territories recorded during the 2018 breeding bird survey work are presented in Figure 14, Section 11.

7.54 SBRC returned 130 records of Arctic skua from within 10 km of the Site since 1999. Of these, 129 relate to single apparently occupied territories, and one record for three territories (west of Colvister, approximately 2.4 km south of the Site). Twenty records were returned from within the Site boundary (eighteen counts in May 2002, one count in June 2002 and one count in June 2017).

7.55 Scotland is at the southern extent of the circumpolar breeding range for Arctic skua. The UK population is estimated to be approximately 2100 breeding pairs (all within Scotland), and comprises 1 % of the world population (Musgrove *et al* 2013). The 3 territories recorded within the Site during survey in 2018 therefore represents less than 0.1% of the UK population. Arctic skua is likely to have an unfavourable Conservation Status on Shetland.

7.56 The current Shetland NHZ breeding population is estimated to be 516 apparent occupied territories, which represents a decline of approximately 54 % on Shetland since 2000 (Wilson *et al,* 2015). A population estimate for Yell following the Seabird 2000 surveys is given as 117 (Pennington *et al,* 2004) but, given the decline noted above, numbers are likely to have reduced in recent years. Wilson *et al* (2015) indicates a decline of 76 % between 1996 and 2015, and this is also reflected in estimates provided by Balmer *et al* (2013) and declines described in Pennington *et al* (2004).

7.57 The factors driving declines in this species are likely to include decreasing food availability (Balmer *et al,* 2013; Perkins *et al,* 2018), predation by great skua (Pennington *et al,* 2004; Perkins *et al,* 2018) and climate change (Wilson *et al,* 2015). The Shetland Bird Club reports that of 37 apparent occupied territories observed on Fair Isle in 2016, 27 failed at the chick stage due to predation by great skua (SBC, 2018)

7.58 The Seabird 2000 surveys estimated a population of 96 apparent occupied territories on Fetlar (Pennington *et al,* 2004). Monitoring data for selected areas on Fetlar provided in SBC (2018) indicates that a peak apparent occupied territory count of 7 was recorded in 2008 and 2009, dropping to 4 territories by 2013. None of the territories in the monitored areas have successfully fledged any chicks since 2009 (when 2 chicks were fledged).

7.59 Adult Arctic skuas demonstrate Site fidelity and typically return to the same nesting location year after year. However, studies in Scotland have found many instances of immature birds settling in a colony up to 150 km from the natal one (Cramp, 1980), and therefore recruitment to and from the population within the Site and local area may occur, i.e. given the degree of dispersal of young birds, recruits into the SPA populations could be coming from anywhere on Shetland. It is concluded that land within the Site is not functionally linked to the Fetlar SPA for Arctic skua as it does not provide an important role in maintaining or restoring the population of qualifying species at favourable conservation status within this European site.

Arctic Tern

7.60 Arctic tern was frequently recorded during VP work and breeding bird walkover surveys between May and August in both 2016 and 2018. A total of 69 flight lines by 127 individuals were recorded, with a peak count of seven birds noted in flight concurrently on 21 July 2016. Arctic tern flight lines recorded during the VP survey work are presented in Figure 15, Section 11.

7.61 Five breeding colonies were recorded during the breeding bird walkover survey in 2016, all outside the Site boundary. The largest colony was located close to the Head of Bratta and comprised 62 individuals, the others were located at Fugla Geo (30 individuals), Singa Tain (30 individuals), west of Gloup Voe (16 individuals) and at Kussa Waters (7).

7.62 In 2018 a total of seven breeding colonies were recorded along the coastline west of the Site, four of which were within 500 m of the Site boundary (none were present within the Site). The colonies recorded within 500 m of the Site comprised 4-10 pairs (near Eagittle), 1 pair (near Burgi Geos), 9 pairs (between Burgi Geos and Swinga Taing) and 1-40 pairs (at Swinga Taing) respectively. The three colonies beyond the 500 m perimeter of the Site were between 650 m and 2 km south west of the Site and comprised 30, 10 and 1 pairs respectively. Arctic tern territories recorded during the breeding bird survey work are presented in Figure 16, Section 11.

7.63 Twenty-eight records of Arctic tern were returned by SBRC from within 10 km of the Site since 1999. One record was returned from within the Site boundary (at the edge of the north-west corner of the Site) and related to one individual flushed in June 2000. Additional records within 2 km of the Site were at Stonganess approximately 2 km east of the Site boundary (22 birds flushed in May 2000 and 5 breeding pairs recorded in summer 2006); at Dalsetter approximately 1.2 km south of the Site (17 birds flushed in May 2000); at Gloup approximately 0.7 km north of the Site (14 birds flushed in June 2000); and to the west of the Site, approximately 0.4 km away (1 bird flushed and 140 birds flushed, both in June 2000). The record of 140 birds (approximately 0.4 km west of the Site) was the largest count provided.

7.64 Arctic tern is likely to be in unfavourable Conservation Status in Shetland. Arctic tern is a common breeding summer visitor to Shetland (SBC, 2018) which supports 10 % of the UK breeding population (the UK breeding population is estimated to be 53,000 pairs, Musgrove *et al,* 2013). Pennington *et al* (2004) indicate that Shetland supported approximately 55 % of the UK population in 2000, but that populations had fluctuated historically and have been shown to be associated with trends in sandeel *Ammodytes* sp. population around Shetland.

7.65 Counts on Fair Isle have demonstrated the scale of such fluctuations, with over 2800 pairs recorded in 2001, falling to 115 pairs in the following year (presumed in response to sandeel availability - Pennington *et al,* 2004). Predation of eggs and chicks by otter *Lutra lutra* is also likely to have an effect on populations (e.g. reduced recruitment, nest abandonment). The Shetland Bird Report (SBC, 2018) notes of 72 nests recorded on Noss in 2016, only five young were fledged successfully; the remainder were predated by otter.

7.66 Individual Arctic terns move between colonies regularly and therefore populations prove difficult to monitor (Balmer *et al,* 2013). However, censuses of the Shetland population between 1970 and 2000 have recorded clear declines, with an estimated loss of 25 % of the Shetland population over this period. The Fetlar SPA has fared particularly poorly, with 2372 pairs recorded in 1980, reducing to 143 pairs in 2000 (Pennington *et al,* 2004).

7.67 No colonies were recorded within the Site during the 2016 and 2018 survey work. However, colonies are present within 500 m of the Site boundary and concentrations of flight activity were noted around lochs surrounding the Site, including at Gloup Lochs (adjacent to the north-eastern corner of the Site), Kussa Water (150 m north-east of the Site) and at Sandy Water (1 km south of the Site), indicating foraging activity or breeding attempts made inland. Therefore, it would be reasonable to expect birds to pass within the airspace over the Site whilst moving around colonies and inland foraging areas.

7.68 Desk study and survey data indicate that Arctic tern does not breed or feed within the Site, only commuting across it. It is therefore concluded that land within the Site is not functionally linked to the Fetlar SPA for Arctic tern as it does not provide an important role in maintaining or restoring the population of qualifying species at favourable conservation status within these European sites.

Fulmar

7.69 A total of 58 fulmar flight lines comprising 92 individuals were recorded during the VP survey work. Fulmar flight lines recorded during the 2016 breeding season VP survey work are presented in Figure 17, Section 11.

7.70 Fulmar territories were confined to the coastal cliffs to the north and west of the Site, and no attempt was made to determine the number of apparent occupied territories in either year. No evidence of breeding activity was recorded within the Site and moorland habitats within the Survey Area.

7.71 SBRC returned twenty-three records for fulmar within 10 km of the Site centre since 1999. The largest flock was recorded north of Houlls Water, approximately 4.6 km south west of the Site boundary (1,812 birds in June 1999). Ten records were returned from within 2 km of the Site boundary, along the coast to the west, north and east of the Site. These records include counts of between 4 and 1,268 birds from 1999-2001.

7.72 Fulmar is the most abundant breeding bird on Shetland which supports approximately 34 % of the UK population (Pennington *et al,* 2004). The number of apparent occupied territories on Shetland reached 182,105 in 1998 – 2002; however, a decline of around 15 % had been recorded between 2000 and 2002 (Pennington *et al,* 2004).

7.73 Hayhow *et al* (2017) indicate that the UK population had declined by approximately 31 % between 2000 and 2015. This trend may be linked to a reduction in whitefish fishing in the North Sea, low recruitment of sandeels (Balmer *et al,* 2013), and climate change (Hayhow *et al,* 2017). However, seabird monitoring conducted by the Shetland Oil Terminal Environmental Advisory Group (SOTEAG) has recorded fluctuations between years and colonies, with total counts within colonies monitored appearing to have increased between 2007 (1565 total apparent occupied sites; 169 at Burravoe, Yell) and 2016 (1626 apparent occupied sites; 214 at Burravoe, Yell). Notwithstanding this, the long term trend between the Seabird 2000 and 2016 census counts show a decline at all monitored Shetland coastlines of between 10 % - 15 % (SBC, 2018). The Conservation Status of fulmar on Shetland is likely to be unfavourable.

7.74 Fulmar is a qualifying feature of the Fetlar SPA; however, it is unlikely the Site and cliff habitats within 500 m of it would support birds originating from colonies at Fetlar. This is because fulmar is known to show a strong breeding site fidelity (Dunnet *et al,* 1963), and whilst they undertake long foraging trips and disperse widely when not breeding (Cramp, 1980), such activities are typically pelagic, with birds rarely settling on land away from their natal colony (e.g. Edwards *et al,* 2013). Individuals within the SPA population are therefore unlikely to pass over the Site regularly.

7.75 It is concluded that land within the Site is not functionally linked to the Fetlar SPA for fulmar as it does not provide an important role in maintaining or restoring the population of qualifying species at favourable conservation status within this European site.

Noise, vibration and visual disturbance – construction phase

Impacts on red-throated diver

7.76 Red-throated divers are susceptible to disturbance, primarily during the breeding season, but disturbance and displacement of passage birds may also occur (Cramp, 1980). Studies by Bundy (1978) indicate that breeding success is significantly affected in areas where both human disturbance and avian predators (such as gulls and skuas) are present. However, reactions to human disturbance are likely to be influenced by the area of water and availability of cover (Bundy, 1978). Ruddock & Whitfield (2007) suggest that divers are more likely to take flight and show signs of active disturbance on smaller breeding lochans in response to human disturbance, than they are on lochs with a maximum dimension of about 400 m or greater.

7.77 Currie & Elliott (1997) recommend safe working distances for forestry operations of 300 m from established nests with chicks and up to 900 m from nest-building. However, Ruddock & Whitfield, (2007) note that most red-throated divers showed signs of disturbance at about 300 – 500 m distance, and suggest that they are insensitive to the presence of observers on the ground when making foraging flights to and from the nest, as long as the observer is not within around 300 m of the nest site. Individuals also vary greatly in their tolerance to human presence (Bundy, 1978) with some birds having been observed not to leave the nest until approached to within a few metres (Ruddock & Whitfield, 2007). Therefore the upper limits of disturbance to nest-building birds suggested by Currie & Elliott (1997) are likely to refer to line of sight distances, and subject to tolerance of individual birds.

7.78 The majority of lochans within the Site have sheltered margins, either due to the presence of longer vegetation, or the surrounding landscape (Simon Pinder, ornithological surveyor, pers. comm.). Gossa Water is the exception, and can be viewed from as far east as the ridge west of Dalsetter, and as far west as the coast. However, breeding was only observed on the southern margin of Gossa Water during 2018 and this feature appeared to typically support non-breeding divers (un-mated, failed or juvenile birds).

7.79 The footprint of the Proposed Development infrastructure approaches to within 298 m of confirmed breeding locations, and to within 230 m of unconfirmed breeding locations. In the absence of mitigation, the construction phase work is likely to result in disturbance effects on breeding red-throated diver, particularly during the nest building period when tolerance to disturbance is lowest. Despite the temporary nature of disturbance during construction, the magnitude of the impact may still be high.

7.80 Monitoring by Upton (2012a; 2014a, b) at Burgar Hill wind farm, Orkney, suggests that numbers of red-throated diver breeding near the wind farm site decreased during construction. Burgar Hill wind farm is located close to Lowries Water, which is a small loch that is reported to have had up to three pairs of the red-throated diver breeding and nesting in the summer months before the wind farm was constructed, and one to two pairs during the operation of the wind farm (Furness, 2015). Orkney Sustainable Energy Ltd[14] and Furness (2015) report that the birds have continued to use Lowries Water over the last 25 years, even though the loch is only 200m from the nearest turbine.

7.81 Meek *et al* (1993) also noted initial declines during and post construction of the original scheme, and attributed their absence during early operation to human disturbance (personnel) as opposed to the turbines themselves

7.82 As noted previously, 4 confirmed breeding pairs were recorded within the Site in 2018 (no confirmed breeding pairs were recorded in 2016) and an additional 2 possible/probable diver territories were recorded within the Site in 2018 (giving a total of 6 pairs). This represents 3.1% of the Bluemull and Colgrave Sounds pSPA population.

Mitigation measures for red-throated diver

7.83 Construction of infrastructure and turbines within 500 m of historical breeding lochans will not be undertaken when red-throated diver arrive (from around mid-March). An Ecological Clerk of Works will monitor diver activity between mid-March and late-July to determine breeding status at each lochan. Once breeding is confirmed and chicks observed to be present, the construction buffer can be reduced based on the results of monitoring, the purpose of which is to identify the distance at which individual pairs start to show evidence of disturbance. The construction buffer will not be reduced below 300 m in line with the lower range of disturbance suggested by Ruddock & Whitfield (2007). Observation will continue at those lochans with confirmed breeding, and within 500 m of active disturbance to check for signs of disturbance behaviour (for example, alarm, frequent diving, or reluctance to return to the nest site). Details of the proposed exclusion measures are provided in Table 4.

7.84 If heavy construction traffic or active works are anticipated to occur closer than 250 m of an historical breeding lochan, then work will only proceed following the completion of a checking survey that confirms that breeding red-throated diver are not present. If breeding red-throated divers are present then work will only commence once the chicks have fledged and the nest vacated. No work or construction traffic will be allowed within 250 m of any breeding lochan.

7.85 These measures are likely to fully mitigate disturbance effects on breeding red-throated diver during the construction phase of the Proposed Development.

Table 4: Exclusion zones and timing for avoidance of disturbance to red-throated diver during construction

Period	**Breeding stage (as confirmed by ECoW)**	**Work exclusion distance**
Mid-March to July inclusive	*Arrival, nest building, incubating*	500 m
April to August inclusive	*Chick brooding/provisioning*	>300 m (distance to be confirmed by monitoring of response to construction activities)

[14] http://www.orkneywind.co.uk/burgar-hill.html

Impacts on waders

7.86 Very few studies focussed on wind farm impacts have considered construction phase disturbance effects on breeding waders. Studies by Finney *et al*. (2005) and Pearce-Higgins *et al*. (2007) have recorded avoidance of highly disturbed tracks and footpaths. Disturbance effects of golden plover adjacent to Pennine Way, Snake Summit, was found to be greatest near to ill-defined footpaths (wherein movement of people over moorland was widespread and unpredictable), but reduced significantly on resurfacing of the footpath, at which point golden plovers only avoided areas within 50 m of the footpath.

7.87 Similar effects on breeding dunlin were not recorded, and habitat occupancy was found to be greatest close to the footpath. Pearce-Higgins *et al*. (2007) indicates that dunlin nest locations were related to the distribution of suitable habitat locally, rather than an affinity for disturbance. However, the study may demonstrate a high threshold for disturbance in dunlin breeding in optimal habitat of limited availability.

7.88 Yalden & Yalden (1989, 1990) found that golden plover typically alarm when humans approached to within 200 m of the nest, and this may reduce nesting or chick provisioning behaviour if persistent. This distance is similar to those reported by Hötker *et al*. (2005) and Pearce-Higgins *et al* (2009) for golden plover disturbance distances from turbines. However, a more recent study by Pearce-Higgins *et al* (2012) reports there is little evidence of population declines in golden plover at wind farm sites, and that golden plover may habituate to wind farms.

7.89 Pearce-Higgins *et al* (2012) found that there was no significant difference between golden plover, lapwing or dunlin densities at wind farm sites between pre-construction, construction and post-construction phases. In contrast, significant adverse effects were found for curlew and snipe, with densities reducing by up to 40 % within 620 m (for curlew) and 500 m (for snipe) during construction and post-construction phases.

7.90 Pearce-Higgins *et al* (2012) indicate that disturbance effects are less likely in species of wader most associated with short-sward vegetation, such as dunlin. However, disturbance effects are still likely to occur within 200 m of nesting sites (as demonstrated for golden plover).

7.91 Based on the baseline survey work for the Site, between 20 and 25 territories for dunlin (of a total 32 recorded in 2016 and 41 recorded in 2018) were located within 200 m of the Proposed Development footprint. Disturbance may therefore affect approximately 60 % of the breeding dunlin within the Site.

7.92 In the absence of species-specific study, it is considered reasonable to adopt the 620 m disturbance distance applied to curlew and to apply that to whimbrel. However, baseline survey work at the Site has not recorded whimbrel breeding within this distance of the Proposed Development (the nearest breeding pair was noted approximately 2.4 km from the nearest infrastructure). Construction phase disturbance effects on whimbrel are therefore likely to be negligible and not significant.

Impacts on skuas

7.93 Both great skua and Arctic skua breed within the Site: a total of 48 great skua and 3 Arctic skua apparent occupied territories were recorded during the breeding season of 2018.

7.94 Skuas are not considered to be particularly sensitive to disturbance in the non-breeding season when using marine waters (Furness & Wade, 2012; Garthe & Hüppop 2004). Furness & Wade (2012) suggest that both great and Arctic skua fall into the category of birds with “hardly any escape behaviour and a very short flight distance when approached“. The authors also suggest a low index value of concern for these species in the context of disturbance and/or displacement from offshore wind farms. Great skua and Arctic skua were ranked at 30 and 32 respectively of 38 study species in order of vulnerability to disturbance. A study by Dawson *et al* (2011) also noted that great skua will nest close to roads (used as a proxy for determining effects of human disturbance), with the greatest factor in nest site selection being proximity to other skua nests.

7.95 Notwithstanding this, skuas are renowned for clearly reacting aggressively to human intrusion, and (unpublished) studies have recorded reactions to light aircraft on Foula. Furness (1977) noted that great skua on Foula appeared to select territories in areas free from human intrusion. Arctic skuas were noted to nest in close proximity to roads and the airstrip on Foula, presumably as these were areas of lowest great skua density. However, this does demonstrate that skuas can be adaptable in their tolerance to disturbance.

7.96 Given the above, it is reasonable to assume that disturbance distances for both skua species are low, and unlikely to be greater than 100 m (in line with those published for other species with a high tolerance of disturbance in Mallory, 2016; Ruddock & Whitfield, 2007; Currie & Elliott, 1997).

7.97 Based on the number and location of apparent occupied skua territories recorded during the 2018 survey work, the Proposed Development may disturb and displace one (of three) Arctic skua territories and twelve (of forty eight) great skua territories. Disturbance and displacement effects may be reduced (given the adaptability and broad habitat use of skuas) for displaced birds that have not yet laid as they can establish a territory away from the source of disturbance.

Mitigation measures for waders and skuas

7.98 To avoid the risk of destruction of the nests of birds (and the killing and injury of nestlings and destruction of eggs), vegetation will be removed in the winter (between October and February inclusive but preferably between November and January). If there is a need for removal of habitats outside the period October to February inclusive, this will need to be overseen by an Ecological Clerk of Works (ECoW), whose role will be to establish whether breeding birds are present or not.

7.99 If construction has to take place between March and August inclusive, the vegetation in any areas for tracks, material laydown, turbine bases and other infrastructure will be kept short during the breeding season until such time that they are developed. This will be achieved by mechanical cutting or strimming during the breeding season. If necessary other nesting deterrents may be used, such as visual bird scarers (e.g. kites). The cleared areas will be visited by an Ecological Clerk of Works (ECoW) to check whether they have been colonised by nesting birds, advise on any restrictions the presence of nesting birds pose and whether further measures are needed to keep the vegetation under control and deter birds from nesting.

7.100 These measures are likely to mitigate impacts on breeding dunlin, great skua and Arctic skua during the construction phase of the Proposed Development by minimising the risk of birds being harmed and disturbed whilst breeding. These measures are likely to result in the displacement of birds away from previous nesting sites.

7.101 An ECoW will scan for breeding birds within a perimeter of up to 200 m of the Proposed Development footprint ahead of the active works. The search perimeter for each species will be reflective of published disturbance distances. These are presented in Table 5.

7.102 If breeding is confirmed within the disturbance distance for the species in relation to the Proposed Development footprint, then active works will be prohibited in that area (as marked out by the ECoW) with allowance for passage by low-level construction traffic only until the ECoW is satisfied that the nesting attempt has been concluded / the young are capable of dispersal. The outcome of all recorded nests will be recorded by the ECoW and included in an annual report.

Table 5: Breeding season search perimeters and exclusion zones around the Proposed Development footprint.

Species	Search/exclusion distance	References
Dunlin	200 m	Pearce-Higgins et al (2012)
Great Skua	100 m	Extrapolated from: Mallory (2016); Ruddock & Whitfield (2007); Currie & Elliott (1997)
Arctic Skua	100 m	Extrapolated from: Mallory (2016); Ruddock & Whitfield (2007); Currie & Elliott (1997)

7.103 If breeding is confirmed within the disturbance distance for any of the above species in relation to the Proposed Development footprint, then active works will be prohibited in that area (as marked out by the ECoW) with allowance for passage by low-level construction traffic only until the ECoW is satisfied that the nesting attempt has been concluded / the young are capable of dispersal.

Impacts on terns and fulmar

7.104 Arctic tern was not recorded breeding within the Site during breeding bird survey work in 2016 or 2018. The nearest colony was located 430 m west of the Proposed Development. Fulmar was not recorded breeding within the Site, and territories noted during the 2018 breeding season work were confined to the cliffs on the west coast of Yell (more than 500 m distant from the Proposed Development).

7.105 Mallory (2016) observed that relatively few gulls and terns appear to initiate flight when humans are greater than 100 m from nests, and a review of disturbance studies by Carney & Sydeman (1999) referenced observations of common terns flushing at an average of 80 m, and least terns at an average of 64 m when approached by observers. Hillman et al. (2015) found no evidence that military or civilian aircraft adversely affected incubation behaviour for tern species in North Carolina.

7.106 Given the distance of Arctic tern colonies and breeding fulmar recorded during the 2016 and 2018 survey work from the footprint of the Proposed Development, disturbance and displacement effects during the construction phase are considered unlikely.

Mitigation measures for terns and fulmars

7.107 No mitigation measures are proposed for terns and fulmars as no significant impacts are predicted.

Noise, vibration and visual disturbance – operation phase

Impacts on red-throated diver

7.108 A monitoring study by Halley & Hopshaug (2007) at Smøla wind farm, Norway, found that red-throated divers avoided the wind farm area post-construction, which may indicate a displacement effect. However, the authors do caution that the variation between pre- and post-construction use of the wind farm may be attributable to normal variation between years given the low sample size. Evidence for displacement of red-throated divers has also been found during monitoring work at the off-shore Kentish Flats (Percival, 2014) and Horns Rev 1 wind farms (Petersen, 2007). However, these studies relate to non-breeding birds in marine environments, and are unlikely to reflect the behaviour of birds at freshwater lochans during the breeding season.

7.109 Red-throated diver flight lines reported in Upton (2012a) indicate that birds frequently fly between the individual turbines on Burgar Hill. However, Furness (2015) suggests that this may be true only for turbines arranged in lines (as in the five turbine Burgar Hill site) and not in array formation.

7.110 It is possible that the Proposed Development may result in displacement of some breeding birds from within some areas of the Site; however, displacement is unlikely to occur from all lochans within the Site. Flight lines recorded during red-throated diver VP surveys indicate that birds breeding at six confirmed and possible breeding lochans within the Site typically use routes that pass greater than 500 m distant from the proposed turbine locations during foraging trips. Birds flying from lochans on Flonga Field head north onto Gloup Voe; those flying from Fulga Water and Grud Water head west over Markamouth.

7.111 For birds breeding at the two lochans at the Hill of Vigeon and Hill of Houllanginga, foraging flights were typically recorded over the proposed locations of turbines 1, 2 and 7. However, a gap of 1.1 km will be present between turbines 2 and 7, and of 770 m between turbines 1 and 2. The turbines at Burgar Hill are located between approximately 360 m and 420 m apart, and divers have been recorded regularly passing between them (as presented above). Whilst it cannot be discounted that the Proposed Development may result in the displacement of birds flying to and from breeding locations at Hill of Vigeon and Hill of Houllanginga, it is considered reasonable, taking into account observations made at Burgar Hill wind farm, that divers are likely to pass between turbines 1, 2 and 7.

7.112 It is considered unlikely that the Proposed Development would result in a barrier effect to birds breeding outside the Site. Flight lines recorded during breeding diver survey work indicate that birds breeding to the east of the Site fly north from nest sites through Gloup Voe to forage, and those breeding to the south of the Site fly west, directly onto the North Sea (see Figure 4, Section 11). Neither route takes birds through the Proposed Development. It is considered unlikely that birds nesting further afield on Yell would need to regularly pass over the Site during flight between nesting sites and foraging grounds (if it is assumed that they would typically take the shortest flight route).

7.113 Birds breeding outside the Site on lochans to the east are unlikely to fly over land further west than Gloup Voe. The only turbines between nesting sites and Gloup Voe are turbines 28 and 29. Birds breeding outside the Site to the south are likely to either fly west to the sea or east into Basta Voe (which is part of the Bluemull and Colgrave Sounds pSPA). This is evidenced by the results of the Red-Throated Diver VP Survey work which demonstrates that divers breeding at the Otterswick and Graveland Peninsula SPA (south of the Site) do not fly north over the Site during foraging trips. Therefore, it is considered that impacts on birds nesting outside the Site arising due to a barrier effect are negligible and not significant.

Mitigation measures for red-throated diver

7.114 If the operation of the Proposed Development results in the displacement of red-throated diver then the possible worst-case scenario is that the displaced birds will move off site and, if they are dominant, they may displace other birds from existing territories (which may then lose their dominance and become unproductive). Alternatively the displaced birds may lose their dominance when they move into adjacent habitat areas, and ultimately they may also become unproductive. Either way birds will be lost from the breeding population so overall the effect will be a reduction in the number of breeding pairs.

7.115 Examination of Ordnance Survey mapping and aerial photography indicates that there are 78 lochans within the Site; however, not all of these may be suitable as nesting locations for red-throated divers. Survey data from 2016 and 2018 indicate that there were unoccupied lochans during the breeding season in both years, which may be due to various reasons including:

- The population of red-throated diver may be below the breeding capacity for the habitat, i.e. there are more lochans than breeding pairs.
- The lochans that are not being used may not be of suitable quality.
- The lochans may be rendered unusable by other factors such as territorial breeding birds.

7.116 The breeding bird survey data indicate that in 2016 and 2018 the closest that a nest site (confirmed and unconfirmed) was to a neighbouring nest site was c.400m. It is assumed from this that territorial behaviour by breeding red-throated diver means that nest sites are unlikely to be established within a 400m buffer around an occupied nest site. If this is applied to lochans within the Site, it would be expected that a cluster of lochans in close proximity to each other (i.e. within 400m) may only support a single breeding pair of red-throated diver (not necessarily a pair per lochan).

7.117 Within the Site there are 78 lochans arranged in 36 clusters, i.e. if territorial behaviour is taken into account, the 78 lochans may only support up to 36 breeding pairs of red-throated diver. In 2016 a total of 3 breeding pairs of red-throated diver were present (confirmed / unconfirmed) and in 2018 a total of 6 breeding pairs were present.

7.118 The high proportion of unoccupied lochans in 2016 and 2018 may be due to low numbers of red-throated diver, but it may also be due to habitat quality, in which case habitat enhancement could increase their suitability. This is also likely to apply to lochans located outside the Site.

7.119 It is also possible that actual or perceived predation risk is deterring red-throated diver from nesting at some lochans. Hulka (2010) notes that predation risk is likely to be '*a key factor determining red-throated diver breeding performance, with breeding pairs more successful when predation risk is low, or if they are able to minimise the risk because they have the nutritional resources or nest site quality that enable them to do this*'. Given the relative abundance of great skua within the Site and wider Survey Area, it is likely that predation risk is an important factor in determining nest site locations.

7.120 When the red-throated diver breeding sites (confirmed and unconfirmed) recorded in 2016 are compared with those recorded in 2018, only 2 locations were used in both years. It therefore seems unlikely that predation by great skua is an important factor given the abundance of this species in both years.

7.121 Enhancement of degraded lochans and/ or creation of new lochans locally (beyond 500 m of turbine locations) will be undertaken prior to the construction phase commencing (to allow time for habitat enhancement measures to establish prior to operation of the Wind Farm). Lochan locations have been plotted on a map together with turbine locations and a 300m buffer (Ruddock & Whitfield, 2007). This shows that there are opportunities to provide alternative suitable habitat for red-throated diver in the area between turbines T2, T3, T5 and T6, and to the west of T10 and T12 (Figure 20, Section 11).

7.122 Measures for habitat enhancement of lochans for divers will include one or more of the following:

- Profiling of degraded or poached margins;
- Creating peat islands;
- Providing nesting rafts (on sheltered lochans);
- Damming lochan outflows to raise and stabilise water levels.

7.123 The enhancement of lochans will provide new nesting opportunities for those red-throated divers that are displaced by the presence of operating wind turbines and the occasional presence of maintenance personnel. These measures are likely to fully mitigate effects on displaced red-throated diver during the operation phase of the Proposed Development (birds may be displaced from 2 lochans).

Impacts on waders

7.124 Dunlin has been recorded breeding within the Site. Whimbrel has been recorded breeding near to the Site and, although the Site is likely to provide suitable breeding habitat for the species, there is no evidence that this species breeds within the Site.

7.125 Hotker *et al* (2006) reported that of 22 operational wind farm sites for which monitoring of wintering golden plover was conducted, six sites showed a minimum disturbance (displacement) distance of 50m, nine of 150m, four of 250m, two of 350m and one 850m. The latter result appears likely to reflect localised circumstances (such as a lack of alternative habitat closer to the site), as it is exceptional. McLoughlin *et al* (2012) conducted post construction monitoring at Out Newton Wind Farm, in the East Riding of Yorkshire. This study, which recorded considerable baseline use of the area by wintering plovers pre-construction, did not suggest that birds were displaced, as slightly elevated use of the airspace close to the turbines was recorded after construction. Studies by Pearce-Higgins *et al* (2012) also suggest that changes to the population of waders, such as golden plover, dunlin, and lapwing, associated with wind farm operation has little effect on local populations. The authors go on to state that birds may become habituated to operational wind farms following any detrimental effects of disturbance during construction.

7.126 If operational phase displacement effects on dunlin do occur, the extent of effects is likely to be limited to 200 m around the proposed turbine locations. This distance is based on published disturbance distances for these other wader species (Yalden & Yalden, 1989, 1990; Hötker et al. 2005; Pearce-Higgins *et al,* 2009).

7.127 On a precautionary basis, displacement effects on dunlin will be minor given the availability of suitable habitat (beyond the likely extent of displacement) within the Site and locally, and the likelihood (based on research referenced above) that local population effects will not occur.

7.128 Curlew (and inferred for whimbrel) is likely to be most affected by post-construction displacement based on the study by Pearce-Higgins *et al* (2012). Populations of curlew appear to decline by up to 40% during the construction phase within a 620 metre area around the outermost turbines of a wind farm. The authors state that (non-significant) increases in numbers have been noted at reference sites which may indicate these birds also move into the wider areas to breed as opposed to being lost to the population; however, there is no clear evidence to support this assertion at present.

7.129 Baseline survey work at the Site has not recorded whimbrel breeding within this distance of the Proposed Development (the nearest breeding pair was noted approximately 2.4 km from the nearest infrastructure). Operational phase displacement effects on whimbrel are therefore likely to negligible and not significant.

Mitigation measures for waders

7.130 The enhancement of upland habitats will provide new nesting opportunities for those dunlin that are displaced by the presence of operating wind turbines and the occasional presence of maintenance personnel. This may also benefit whimbrel, which does not currently breed within the Site. The proposed habitat enhancement measures are likely to fully mitigate effects on displaced dunlin during the operation phase of the Proposed Development (up to 41 territories may be displaced).

7.131 Whimbrel typically favours serpentine heathlands and moorland on Shetland, but will also breed on blanket bog and acid grassland (Pennington et al, 2004). Mitigation measures will therefore target management of a habitat mosaic locally.

7.132 Grant *et al* (1992) suggest that a mosaic of unimproved heath, with areas seeded with grass after ploughing or harrowing, provide a good foraging and breeding habitat for whimbrel. Identified management areas should also be subject to managed grazing through the provision of stock fencing.

7.133 Grazing management will also occur near to high densities of breeding dunlin. Where retained, these, and other identified areas of blanket bog, should be free from grazing between April and July inclusive to allow a cover sward to develop. A number of scrapes will be also be created in areas of managed blanket bog to provide feeding opportunities for waders.

Impacts on skuas

7.134 As outlined in the construction phase impact assessment for these species, skuas are unlikely to demonstrate wide-ranging disturbance or displacement responses during operation of wind farms (Furness & Wade, 2012; Garthe & Hüppop 2004). Displacement effects are likely to be representative of disturbance distances during operation, and unlikely to extend beyond 100 m of the turbine rotor swept area.

7.135 A study by Furness (1977) noted that Arctic skua nested in close proximity to roads and the airstrip on Foula. The authors conclude that this association was driven by densities of great skua in less disturbed areas, i.e. birds were utilising unoccupied areas of suitable habitat. It is possible that the Proposed Development may provide opportunities for Arctic skua if great skuas are displaced.

Mitigation measures for skuas

7.136 No mitigation measures are proposed for skuas as no significant effects are predicted.

Impacts on terns and fulmar

7.137 Displacement of Arctic tern and fulmar is unlikely to occur given that these species were not recorded breeding within the Site. The nearest Arctic tern colonies recorded during the survey work were approximately 430 m from nearest proposed turbines. Fulmar nest sites were confined to the coastal cliffs which are in excess of 500 m from the nearest proposed turbine. Operational phase displacement effects on Arctic tern and fulmar are therefore likely to be negligible and not significant.

Mitigation measures for terns and fulmar

7.138 No mitigation measures are proposed for terns and fulmars as no significant effects are predicted.

Noise, vibration and visual disturbance – decommissioning phase

Impacts on qualifying features

7.139 Decommissioning phase impacts on all qualifying features are generally regarded as similar to those experienced during the construction phase, albeit less intrusive (Energy Isles Wind Farm EIA Report, Chapter 7 Ecology, Section 7.10.25).

7.140 Breeding and foraging habitats that are lost during the construction phase will be allowed to regenerate to a condition representative of the pre-development baseline, and turbine foundations may be left in situ but will be buried with top-soil to allow colonisation of vegetation present within the surrounding area.

7.141 Species most likely to be disturbed and displaced from the Site during decommissioning are those that breed, roost or forage within it at that time.

7.142 It is reasonable to expect that there may be changes in legislation concerning birds, as well as changes in local populations and distribution over the operational life of the Proposed Development. These may be driven by climatic change, landscape-scale land management, increased effectiveness / policing of protection, changes in the attitude of land managers to birds, the spread of reintroduced populations, changes in the wintering and staging grounds of migrant species, disease and other factors.

7.143 Predictions are not therefore possible, with any confidence, over the 30 year operational life of the Proposed Development (particularly given the rate of change in number and distribution of many species over the past 30 years). Whilst effects on birds will be addressed through a decommissioning phase Environmental Management Plan, as noted above, it is expected that decommissioning phase effects will be similar to or less than those experienced during the construction phase for all qualifying species.

Mitigation measures for qualifying features

7.144 Mitigation measures that will be adopted during the decommissioning phase of the development are expected to be similar to those adopted during the construction phase. Measures will be adopted that reflect the presence and distribution of qualifying features at the time that the wind farm has ceased operation and decommissioning commences.

Increased mortality – construction phase

Impacts on qualifying features

7.145 During the construction phase of the Proposed Development, in the absence of mitigation, it is possible that birds nesting within the footprint of the Proposed Development could be killed or injured during the preparatory works (vegetation removal and soil stripping). Dunlin is the only SPA qualifying feature (Fetlar SPA) that is potentially vulnerable to increased mortality in this way as survey identified 7 territories in 2016 and 10 territories in 2018 that were centred on infrastructure elements (e.g. turbine foundations, temporary crane pads and access tracks). In the absence of mitigation measures it is possible that adult birds could be displaced and their young killed where nest locations are located within the development footprint.

Mitigation measures for qualifying features

7.146 No mitigation measures are proposed for any qualifying features as no significant mortality-related impacts are predicted during the construction phase of the Proposed Development.

Increased mortality – operation phase

7.147 During the operation of the Proposed Development it is possible that birds flying through the Proposed Development will collide with moving turbine blades. In the following sections collision risk is considered for each of the qualifying species identified within the Site during survey.

Impacts on red-throated diver

7.148 Collision related impacts on red-throated diver are considered in detail in Energy Isles Wind Farm EIA Report, Chapter 6 Ornithology (Section 6.7.97 et seq).

7.149 Dürr (2019) reports one documented collision for red-throated diver in Europe, occurring at Bremen, Germany. It is possible that the species' tendency to avoid wind farms (e.g. Halley & Hopshaug, 2007; Percival, 2014; Petersen, 2007; Topping and Petersen, 2011) precludes collision risk to some degree. Few collisions by red-throated diver have been reported in the literature. Okill (1994) reports the recovery of the carcass of a red-throated diver killed by flying into overhead wires, and Furness (2015) provides two further examples of birds reportedly flying into fences on Foula. These observations indicate that occasionally bird mortalities may occur due to collisions with static structures, although the circumstances under which these deaths occurred is not known. Furness (2015) further suggests that red-throated diver may actively avoid turbines due to their vulnerability of colliding with objects.

7.150 Post construction monitoring work by Upton (2012a; 2014a, b) at Burgar Hill wind farm, Orkney, did not find any evidence of red-throated diver collision over eight breeding seasons. However, the Burgar Hill site supports fewer breeding pairs (both pre- and post-construction) than recorded at the Proposed Development Site.

7.151 Red-throated diver was recorded in flight within the Collision Risk Volume on 34 occasions during VP survey work in 2016, and on 56 occasions during 2018. The total flight time within the Collision Risk Volume for each year respectively was 2 hours, 26 minutes and 5 seconds (in 2016) and 3 hours, 45 minutes and 15 seconds (in 2018). Using a 99.5 % avoidance rate (which is endorsed by SNH[15]), the rate of collision predicted by the model[16] is between 0.12 (based on 2016 data) and 0.18 (based on 2018 data) collisions per annum. This equates to 1 bird killed every 5.6 to 8.6 years, or between 3 and 5 collisions over the operational lifespan of the Proposed Development.

[15] https://www.nature.scot/sites/default/files/2018-09/Wind%20farm%20impacts%20on%20birds%20-%20Avoidance%20rates%20guidance%20-%20table.pdf
[16] A collision risk model was developed by Bill Band of SNH and published in de Lucas *et al*, 2007).

7.152 Red-throated divers are reasonably predictable in their flight behaviour when brooding and provisioning young. Furness ((2015); referencing Furness, 1983 and Eriksson, et al. 1990) indicate that flights by breeding birds are direct between the nest site and foraging areas at sea, and occur at a consistent frequency. The breeding population within the Survey Area (eleven confirmed and 13 unconfirmed breeding pairs recorded in 2018) is likely to represent a small proportion of the total number of individuals present. The surveyors reported up to 103 birds present during breeding bird survey visits in July 2016, the majority of which are likely to have been non-breeding birds.

7.153 Analysis of the flight lines that pass within the Collision Risk Volume suggest that they are predominantly made up of wheeling and looping flights between lochans, not representative of direct flights expected by breeding birds. In addition approximately 47% of the total number of flights within the Collision Risk Volume (19 of 34 flights in 2016 and 24 of 56 flights in 2018) occurred in August when birds are likely to have been dispersing.

7.154 Given this, it is reasonable to assume that collisions are most likely to affect young (first winter / sub adult) or non-breeding birds. It is considered that the effect on the population is, therefore, likely to be imperceptible, as rates of fledgling (due to predation) and overwintering survival for first year birds are likely to be low. If adult / breeding birds are killed, this would potentially open up an opportunity for the recruitment of sub adults into the breeding population to replace them (which is likely given the number of non-breeding birds present).

7.155 The 2018 Shetland Bird Report (SBC, 2018) indicates a mean fledging rate of 0.58 for nests within monitored areas on Shetland between 2007 and 2016. Applying this rate to the number of confirmed breeding pairs within the Survey Area in 2018 (11 pairs), it would be expected that productivity within the Site should reach an average of 6.38 birds per year. A reduction of this productivity rate by 0.18 as a result of collision (based on 2018 data) is unlikely to have significant adverse effect on population of red-throated diver.

Mitigation measures for red-throated diver

7.156 As described in Chapter 2: Design Iteration of the EIA Report, the Proposed Development has gone through ten major iterative design changes (A to J), from November 2017 to the design being taken forward for this 2019 application. Commencing from an initial design aimed at maximising capacity, design development has included:

- reduction of the site application area to avoid conflicts with the RSPB Lumbister nature reserve and the majority of the north-eastern and south-western lochs and lochans, including avoidance of the Gossa Water catchment watershed;
- reduction of the number of turbines from an initial 68 (Layout A) to 50 (Layout B), then to 31 (Layout C) and then finally to 29 (Layout D onwards), in order to reduce the loss of peatland and avoid bog pool complexes;
- creation of turbine-free “passages” for bird commuting;
- routing of the site tracks and turbine locations to minimise impacts to the deeper peat deposits and limit the number of watercourse crossings;
- rotation of crane pad locations to avoid deeper peat deposits;
- relocation of the substation to reduce the access track connection; and
- re-defining of the borrow pit search areas to reduce size, avoid deeper peat deposits, reduce transport requirements (by locating close to the access tracks) and/or to follow hill contours.

7.157 The designed in mitigation has resulted in a wind farm layout that has reduced the predicted collision risk for red-throated diver.

Impacts on whimbrel

7.158 Collision related impacts on whimbrel are considered in detail in Energy Isles Wind Farm EIA Report, Chapter 6 Ornithology (Section 6.7.106 et seq).

7.159 Dürr (2019) reports two collisions of whimbrel with turbines from within Europe, both at Bouin wind farm, France.

7.160 Ringing data provided by Clark *et al* (2004) indicate two British ringed birds re-trapped in Bouin: one of which was a bird ringed at Fetlar (likely to be a breeding bird) in June 1987 (re-trapped Bouin April 1993).

7.161 A total of 6 flights of whimbrel were recorded during the VP survey work: 5 were recorded during August 2018 and 1 recorded in July 2016. Collision modelling has been undertaken for the 2018 data; however, given the low number of flights recorded, the output is unlikely to be statistically robust. Insufficient flight activity was recorded for whimbrel in 2016 to complete a meaningful analysis, and therefore, collision risk based on 2016 data has not been modelled. Whilst the low number of whimbrel flights means that the collision risk analysis is unlikely to be statistically robust, it is apparent that the collision risk will be very low for this reason.

7.162 Based on the default avoidance rate of 98 % (as recommended in SNH, 2017), the model predicts a collision mortality rate of 0.2 birds per year, or 1 bird killed every 5 years.

7.163 No whimbrel were recorded breeding within the Site (three breeding territories (one in 2016 and two in 2018) were recorded at the Lochs of Lumbister approximately 2 km south of the Site). In addition, flights by this species within the Collision Risk Volume occurred late in the breeding season of both survey years (July 2016 and August 2018). This would suggest that the airspace over the Site is unlikely to be used regularly by breeding adults, but traversed occasionally by passage birds (including a proportion of fledglings) moving between foraging grounds.

7.164 The impacts of mortality on whimbrel may be amplified due to the low regional (290 pairs) and national (400-500 pairs) population. However, the loss of 0.16 birds per annum as a result of collision is unlikely to be discernible, particularly as the risk of collision is likely to be biased towards non-breeding birds (no breeding birds have been recorded within the Site with recorded flights thought to be passage birds). Operation phase effects on whimbrel are therefore likely to negligible and not significant.

Mitigation measures for whimbrel

7.165 Refer to paragraph 156.

Impacts on great skua

7.166 Collision related impacts on great skua are considered in detail in Energy Isles Wind Farm EIA Report, Chapter 6 Ornithology (Section 6.7.117 et seq).

7.167 A total of 169 flights by great skua were recorded passing within the Collision Risk Volume during the 2016 breeding season VP work. This resulted in 7 hours, 27 minutes and 1 second of flight time.

7.168 A further 15 flights were recorded within the Collision Risk Volume between 20 September and 02 November 2017 during the winter period VP work. However, this activity has not been included in the model. It was considered appropriate in this instance to discount flights by great skua that occurred outside of the breeding season, as flights are infrequent, likely to be made by dispersing or wandering individuals and are not representative of the breeding season activity.

7.169 In addition, the model accounts for the period of the year over which the species are likely to be present within the airspace over the Site. It is more robust to indicate that this period is restricted to the breeding season (taken as April to August inclusive) when activity over the Site is greatest and most consistent. If this period is extended into the autumn when the majority of individuals have moved off-land and activity over the Site is far lower, then this will dilute the output of the model, i.e. a precautionary approach has been adopted (presence has not been assumed in some months for the purposes of modelling, as to do so would dilute the summer collision statistics).

7.170 Great skua was not recorded as a target species during the 2018 breeding season VP work (as agreed in consultation with SNH; Energy Isles Wind Farm EIA Report, Chapter 6 Ornithology, Section 6.4.1 et seq) due to the large numbers of birds present, and collection of sufficient information in 2016 to robustly inform collision risk.

7.171 Modelling based on the 2016 data has resulted in a predicted rate of collision of 0.35 great skuas per year, or 1 bird every 3 years (on the basis of 99.5 % avoidance, which is endorsed by SNH).

7.172 No collisions of great skua with wind turbines in Europe have been documented by Dürr (2019). Upton (2014c) suggest that the recommended collision avoidance rate of 99.5 % for great skua is a precautionary one, and post construction carcass searching at Burgar Hill wind farm, Hammars Hill wind farm and Hoy community turbine (Upton, 2012b) has resulted in no evidence of collision being found for this species. Furness (2015) further indicates anecdotal evidence that great skua carcasses typically remain in-situ for long-periods due to an apparent reluctance of great skua to scavenge their kin (despite frequently scavenging carcasses of other species). Carcass searches are therefore likely to be a reliable monitoring method for this species, and the conclusions drawn by Upton (2014c) are likely to be robust.

7.173 Breeding bird survey work in 2018 recorded 46 apparent occupied territories within the Site, with a further 45 territories within 500 m of the Site boundary. Productivity within the Site is likely to be high and, based on the mean success of birds breeding in monitored areas in Shetland reported by SBC (2018), the Site may fledge 21.4 birds per year. This reflects the reported population expansion within the Shetland NHZ of 52 % by the Seabird 2000 and the 2006 - 2013 Seabird Monitoring Program surveys.

7.174 Given the current population increases reported in Shetland, and likely high productivity of the Site, it is considered unlikely that a loss of 0.27 great skua per year as a result of collision with turbines will have any discernible effect on the population.

Mitigation measures for great skua

7.175 Refer to paragraph 156.

Impacts on Arctic skua

7.176 Collision related impacts on Arctic skua are considered in detail in Energy Isles Wind Farm EIA Report, Chapter 6 Ornithology (Section 6.7.124 et seq).

7.177 Three flights by Arctic skua were recorded passing within the Collision Risk Volume during the 2016 breeding season VP work and ten flights were recorded in 2018. This resulted in 5 minutes and 9 seconds of flight time during 2016 and 11 minutes and 4 seconds during 2018. Although very low rates of flight activity within the Collision Risk Volume were recorded, modelling has been undertaken for Arctic skua for completeness.

7.178 SNH (2017) accept an avoidance rate of 99.5 % for Arctic skua based on Furness (2015). This is supported by an absence of documented collisions in Europe (Dürr, 2019). Modelling based on the accepted avoidance parameters has resulted in a predicted rate of collision of between 0.003 (based on 2016 data) to 0.02 (based on 2018 data) Arctic skuas per year, or 1 bird every 66 to 358 years, i.e. no Proposed Development related mortality is predicted during its operational life (30 years). Operation phase effects on Arctic skua are therefore likely to negligible and not significant.

Mitigation measures for Arctic skua

7.179 Refer to paragraph 156.

Impacts on Arctic tern

7.180 Collision related impacts on Arctic tern are considered in detail in Energy Isles Wind Farm EIA Report, Chapter 6 Ornithology (Section 6.7.127 et seq).

7.181 Very low rates of flight activity within the Collision Risk Volume were recorded for Arctic tern. The 2016 VP survey work recorded 7 flights (7 minutes 57 seconds) and the 2018 VP work 3 flights (2 minutes 43 seconds). Collision modelling has been undertaken for Arctic tern for completeness; however, the output is unlikely to be statistically robust. Whilst the low number of Arctic tern flights means that the collision risk analysis is unlikely to be statistically robust, it is apparent that the collision risk will be very low for this reason.

7.182 There have been no specific studies of collision risk in Arctic tern to inform avoidance rates. Therefore SNH (2017) accept the default 98 % avoidance rate for this species. However, the actual avoidance rate for Arctic tern may greater than this since no collisions have been documented in Europe by Dürr (2019) for this species, and the flight habits of terns are akin to gulls and skuas for which an accepted avoidance of 99.5 % is applied.

7.183 Nevertheless, modelling based on 98 % avoidance results in a collision rate of between 0.01 (based on 2018 data) and 0.02 (based on 2016 data) Arctic tern killed by collision per annum, or 1 bird killed every 45 to 83 years, i.e. no Proposed Development related mortality is predicted during its operational life (30 years). Operation phase effects on whimbrel are therefore likely to negligible and not significant.

Mitigation measures for Arctic tern

7.184 Refer to paragraph 156.

Impacts on fulmar

7.185 Collision related impacts on fulmar are considered in detail in Energy Isles Wind Farm EIA Report, Chapter 6 Ornithology (Section 6.7.131 et seq).

7.186 Fulmars were recorded flying within the Collision Risk Volume on 10 occasions (total 22 minutes and 6 seconds) during the 2016 VP work and on 6 occasions (total 14 minutes and six seconds) during the 2018 work. Modelling based on a 98 % avoidance rate suggests that between 0.18 (based on 2016 data) and 0.06 (based on 2018 data) birds will collide with turbines per annum. This equates to 1 bird killed every 5.7 to 17.3 years.

7.187 The difference in the prediction of collision risk between years is relatively large, and is likely to be due to differences in the duration of a low number of flights (and small number of individuals) through the Collision Risk Volume (as the number of recorded flights for both survey years are low). Nevertheless, as a worst case, the model predicts that four birds will collide with turbines over the operational period of the wind farm. However, the number of fatalities may be less than this as avoidance rates for fulmar are likely to exceed the default 98 % (as suggested by Maclean et al., 2009).

7.188 Dürr (2019) has documented three collisions by fulmar in Europe. Of these, one occurred at Blyth Harbour Wind Park in Northumberland, UK. Newton & Little (2009) report that the bird collided with a turbine tower rather than being struck by the blades. It is possible in this instance (given that the collision was with a large static object), that the bird was foraging and, therefore, looking down at the water. This blindness in the direction of flight whilst foraging has been documented in collision prone species (including species of crane, bustard, vulture and eagle) by Martin (2017). However, it is unlikely that fulmar would exhibit this behaviour when flying over land (and therefore, not foraging) and it would be expected that the susceptibility to collision would be greatly reduced in these instances. Indeed, the number of fulmar collisions in Europe documented by Dürr (2019) is very low in the context of populations, and Maclean *et al*. (2009) do not suggest that the species is vulnerable to collision.

7.189 There are no breeding fulmars within the Site. Territories recorded within the Survey Area were restricted to coastal cliffs to the west of the Site. Breeding adults are likely to fly from the nest sites to foraging grounds at sea and are therefore unlikely to pass over the Site with any regularity. The majority of flights recorded within the Collision Risk Volume occurred during August (4 flights in 2016 and 9 flights in 2018) when fulmars are likely to be dispersing, and include a large proportion of newly fledged birds. Collision risk is therefore more likely to be greater for dispersing juvenile birds than breeding adults.

7.190 Given that the Shetland fulmar population is subject to large annual fluctuations (primarily in response to sandeel productivity; Pennington *et al,* 2004, Balmer *et al,* 2013, Hayhow *et al,* 2017, SBC, 2018) it is considered unlikely that the loss of 0.18 birds to collision (as a worst case scenario) will have a measurable effect on the population.

Mitigation measures for fulmar

7.191 Refer to paragraph 156.

Increased mortality – decommissioning phase

Impacts on all qualifying species

7.192 Decommissioning phase impacts are generally regarded as similar to those experienced during the construction phase, albeit less intrusive (Energy Isles Wind Farm EIA Report, Chapter 7 Ecology, Section 7.10.25).

7.193 Species most likely to be killed or harmed within the Site during decommissioning are those that breed within it at that time. It is reasonable to expect that there may be changes in local populations and distribution over the operational life of the Proposed Development. These may be driven by climatic change, landscape-scale land management, increased effectiveness / policing of protection, changes in the attitude of land managers to birds, the spread of reintroduced populations, changes on the wintering and staging grounds of migrant species and other factors.

7.194 Predictions are not therefore possible, with any confidence, over the 30 year operational life of the Proposed Development (particularly given the rate of change in number and distribution of many species over the past 30 years). Whilst effects on birds will be addressed through a decommissioning phase Environmental Management Plan, as noted above, it is expected that decommissioning phase effects will be similar to those experienced during the construction phase.

Mitigation measures for all qualifying species

7.195 Mitigation measures that will be adopted during the decommissioning phase of the development are expected to be similar to those adopted during the construction phase. Measures will be adopted that reflect the presence and distribution of qualifying features at the time that the wind farm has ceased operation and decommissioning commences.

Provision of mitigation measures

7.196 Broad habitat and species mitigation measures for the construction and operational phases of the Proposed Development will be defined within the Site Construction Environmental Management Plan (CEMP). The OHMP (see Appendix 7.7 of the EIA Report) provides an overview of proposed mitigation, habitat enhancement and focussed monitoring as summarised below.

7.197 The assessment assumes the application of standard mitigation measures in accordance with CIEEM (2018) guidance. A range of measures have already been applied as part of the iterative design process (see below and Chapter 2: Design Iteration), to avoid the higher quality habitats (see Chapter 7: Ecology and Nature Conservation of the EIA Report). Standard mitigation will include general measures to comply with the provisions of the Wildlife and Countryside Act 1981 (as amended) as well as adherence to current environmental protection policies and guidance, including but not limited to:

- Good Practice During Wind Farm Construction (SNH, 2015a)
- Constructed tracks in the Scottish uplands (SNH, 2015b);
- WAT-SG-75 (SEPA, 2018);
- A Practical Guide to the CAR Regulations (SEPA, 2019); and
- LUPS-GU31 (SEPA, 2014).

7.198 The development of a CEMP, in consultation with stakeholders (i.e. SEPA, SNH and Shetland Islands Council) will also be implemented, and will include:

- Appointment of a suitably qualified and experienced Ecological Clerk of Works (ECoW) to oversee application of the CEMP;
- HMP; see Appendix 7.7 for the Outline HMP (OHMP).
- Preconstruction ornithological survey programme to provide updated baseline information to feed into the CEMP and other operational plan documents;
- Use of Method Statements during construction, to include current good practice and prescribed use of low noise and vibration plant to limit disturbance and displacement effects;
- Development of an Operational Site Management Plan, (OSMP) to include an HMP and maintenance task Method Statements;
- Mitigation through Design Iteration.

Summary of residual effects

7.199 Taking into account the proposed mitigation measures the residual effects on qualifying features (birds) are summarised below.

7.200 During the construction phase the following effects may occur:

- Disturbance and displacement of red-throated diver: Up to 6 territories could be displaced and these will be accommodated elsewhere on site through habitat enhancement. Overall it is concluded that effects can be mitigated and consequently there will not be an adverse effect on the integrity of the Bluemull and Colgrave Sounds pSPA.
- Disturbance and displacement of dunlin: Up to 25 territories could be displaced and these will be accommodated elsewhere on site through habitat enhancement. Overall it is concluded that effects can be mitigated and consequently there will not be an adverse effect on the integrity of the Fetlar SPA.
- Disturbance of Arctic skua: Up to 1 territory could be displaced. Effects have been mitigated through design iteration and overall it is concluded that there will not be an adverse effect on the integrity of the Fetlar SPA.
- Disturbance of great skua: Up to 12 territories could be displaced. Effects have been mitigated through design iteration and overall it is concluded that there will not be an adverse effect on the integrity of the Fetlar SPA.
- Death or injury of dunlin: In the absence of mitigation up to 10 nest locations may be directly impacted as they are located within the development footprint. Implementation of mitigation measures means that effects will be avoided and overall it is concluded that there will not be an adverse effect on the integrity of the Fetlar SPA.

7.201 During the operation phase collision-related mortality is predicted to be low for all species and of a magnitude where it is expected that there will be no discernible population-level effect above natural mortality levels. The following effects may occur:

- Displacement of red-throated diver: Up to 6 territories could be displaced and these will be accommodated elsewhere on site through habitat enhancement. Overall it is concluded that effects can be mitigated and consequently there will not be an adverse effect on the integrity of the Bluemull and Colgrave Sounds pSPA.
- Displacement of dunlin: Up to 25 territories could be displaced and these will be accommodated elsewhere on site through habitat enhancement. Overall it is concluded that effects can be mitigated and consequently there will not be an adverse effect on the integrity of the Fetlar SPA.
- Displacement of Arctic skua: Up to 1 territory could be displaced. Impacts have been mitigated through design iteration and overall it is concluded that there will not be an adverse effect on the integrity of the Fetlar SPA.

- Displacement of great skua: Up to 12 territories could be displaced. Impacts have been mitigated through design iteration and overall it is concluded that there will not be an adverse effect on the integrity of the Fetlar SPA.
- Collision of red-throated diver with turbines (1 bird every 5.6 to 8.6 years). The predicted collision related mortality is low and so there will be no adverse effect on the integrity of the Bluemull and Colgrave Sounds pSPA.
- Collision of whimbrel with turbines (1 bird every 5 years). The predicted collision related mortality is low and so there will be no adverse effect on the integrity of the Fetlar SPA.
- Collision of great skua with turbines (1 bird every 3 years). The predicted collision related mortality is low and so there will be no adverse effect on the integrity of the Fetlar SPA.
- Collision of Arctic skua with turbines (1 bird every 45 to 83 years). The predicted collision related mortality is very low and so there will be no adverse effect on the integrity of the Fetlar SPA.
- Collision of fulmar with turbines (1 bird every 5.7 to 17.3 years). The predicted collision related mortality is low and so there will be no adverse effect on the integrity of the Fetlar SPA or the Hermaness, Saxa Vord and Valla Field SPA.

7.202 During the decommissioning phase impacts may occur that are expected to be no worse than those predicted for the construction phase.

7.203 It has previously been concluded that land within the Site may be functionally linked to European sites for some qualifying species as follows:

- The land within the Site may be functionally linked to the Bluemull and Colgrave Sounds pSPA for red-throated diver, i.e. it may provide an important role in maintaining or restoring the population of red-throated diver within the pSPA at favourable conservation status.
- The land within the Site may be functionally linked to the Fetlar SPA for dunlin, i.e. it may provide an important role in maintaining or restoring the population of red-throated diver within the pSPA at favourable conservation status.

7.204 SNH (2016b) indicates that the Bluemull and Colgrave Sounds pSPA potentially supports the food supplies of up to 194 pairs of red-throated diver. Therefore the potential displacement of up to 6 territories is equivalent to 3.1% of the pSPA population. However, flightline data indicate that birds nesting within the site tend to fly north or west rather than south towards the pSPA (see Figure 5, EIA Report). Consequently no significant displacement effects are predicted for red-throated diver associated with the pSPA.

7.205 The Fetlar SPA supports 90 pairs of breeding dunlin and, whilst the Proposed Development Site supports 41 dunlin territories, these are clearly separate from the SPA population, which is 3.9 km to the south east at its closest point. Nevertheless, the breeding population within the Site may have a role to play in supporting the SPA population, for example though immigration when birds occupy suitable nesting habitat following the death of a bird. This is also likely to be the case for other parts of Shetland, such as Hascosay SSSI and Hill of Colvadale and Sobul SSSI, both of which are reported to support populations of dunlin in the site citations.

7.206 Ryan *et al* (2015) reported that in their study the survival rate for adult dunlin was 0.72 and the survival rate for juveniles was 0.47 (the lowest rate was 0.34). Similar survival rates have been reported by other authors (Soikkeli, 1970; Robinson *et al*, 2007). The survival figures reported by Ryan *et al* (2015) gave a slight shortfall of 1% in the number of recruits to the population in the following season. If this is applied to the Fetlar SPA population then the number of recruits required to ensure that SPA population remains stable is likely to be small. As noted above, dunlin is widespread in Shetland and therefore the contribution of dunlin from the Proposed Development Site to Fetlar SPA is likely to be small.

7.207 The Proposed Development could result in the displacement of up to 25 dunlin territories; however, it is a common breeding summer visitor on Shetland (SBC, 2018) with an estimated Shetland NHZ breeding population of 2,054 pairs (Wilson et al, 2015). Consequently the 25 dunlin territories that may be displaced represents 1.2% of the breeding population in Shetland.

7.208 Studies by Pearce-Higgins *et al* (2012) also suggest that changes to the population of waders, such as golden plover, dunlin, and lapwing, associated with wind farm operation has little effect on local populations. The authors go on to state that birds may become habituated to operational wind farms following any detrimental effects of disturbance during construction.

7.209 If operational phase displacement effects on dunlin do occur, the extent of effects is likely to be limited to 200 m around the proposed turbine locations. This distance is based on published disturbance distances for these other wader species (Yalden & Yalden, 1989, 1990; Hötker et al. 2005; Pearce-Higgins *et al,* 2009).

7.210 Any displaced territories will be accommodated through existing areas of suitable alternative habitat within the Site and through habitat enhancement to create more favourable nesting habitat. It is expected that displacement effects can be fully mitigated in this way.

7.211 The draft conservation objectives for the Bluemull and Colgrave Sounds pSPA are described as follows: '*To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, subject to natural change, thus ensuring that the integrity of the site is maintained in the long-term and it continues to make an appropriate contribution to achieving the aims of the Birds Directive for each of the qualifying species*.' As Bluemull and Colgrave Sounds is a proposed SPA no condition assessment information is currently available.

7.212 The Proposed Development supports a small number of breeding red-throated diver, and so habitats within the Site may be functionally linked to the pSPA. Whilst the construction, operation and decommissioning phases of the Proposed Development may result in the disturbance and displacement of birds, it is considered that suitable nesting habitat can be made available in areas that are sufficiently distant from wind turbines that disturbance and displacement related effects are unlikely (Figure 20, Section 11).

7.213 The draft conservation objectives for the Fetlar SPA are 'To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and 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

7.214 The condition of the SPA was last assessed on 21 June 2016 for some qualifying features but some features were last assessed before this, the oldest assessment being for dunlin in 2003. The assessment has concluded that 50% of the SPA is in favourable condition and 50% is described as unfavourable recovering. With regard to the individual qualifying features, the following species are described as being in favourable condition: dunlin, great skua, red-necked phalarope and whimbrel. The following qualifying features are described as being in unfavourable condition: Arctic skua, Arctic tern, fulmar and the seabird assemblage.

7.215 The Proposed Development supports breeding dunlin, and so habitats within the Site may be functionally linked to the SPA. Whilst the construction, operation and decommissioning phases of the Proposed Development may result in the disturbance and displacement of dunlin, it is considered that there is suitable nesting habitat can be made available in areas that are sufficiently distant from wind turbines that disturbance and displacement related effects are unlikely.

7.216 Taking into account the proposed mitigation measures, it is concluded that the proposed development will not have an adverse effect on the integrity of Bluemull and Colgrave Sounds pSPA, Otterswick and Graveland SPA, Fetlar SPA, Hermaness and Saxa Vord and Valla Field SPA. The land within the Site is functionally linked to the Bluemull and Colgrave Sounds pSPA for red-throated diver and to the Fetlar SPA for dunlin. Proposed measures will ensure that impacts on red-throated diver and dunlin (and other SPA qualifying features) are mitigated.

8 The identification of other plans and projects

Overview

8.1 As part of the assessment, other plans and projects with potential to have 'in-combination' effects on European sites have also been considered (as required under Regulation 63(1)a of the Conservation of Habitats and Species Regulations 2017). The scope of the 'in-combination' assessment has been derived with reference to the source-pathway-receptor model, which highlights whether there is any potential pathway that connects the Proposed Development, in-combination with other plans and projects, to any European site.

8.2 The appropriate assessment has considered the effects arising from the construction of the wind farm on the Bluemull and Colgrave Sounds pSPA, Otterswick and Graveland SPA, Fetlar SPA, Hermaness and Saxa Vord and Valla Field SPA. In summary, an impact is only likely to occur in combination with another plan or project if it is possible that they could collectively impact on the same population of qualifying features (i.e. birds). For this reason the 'in-combination' assessment has not considered small scale projects involving up to two turbines as the bird survey data indicate that there is no mechanism by which 'in-combination' effects can occur. There are none of these small scale developments in locations where they could impact on the same bird populations as the Proposed Development.

8.3 In-combination effects are most likely to result with regard to those qualifying features for which a residual effect is predicted, particularly if the core range of these features includes other planned, consented or built development. Given the wide ranging behaviour of some species found within the Site, it is considered reasonable that cumulative effects should be considered in relation to other plans or projects that fall within the Shetland NHZ.

Wind farm developments considered

8.4 There are five consented or operational wind farms within the Shetland NHZ for which information has been sought. Summary details for these sites are presented in Table 6 (below).

Table 6 Wind farm developments considered as part of cumulative assessment.

Wind farm	Distance from Site (km)	Number of turbines	Status
Garth	1.5	5	Consented
Beaw Field	15.3	17	Consented
Viking	37.3	103	Consented
Gremista	53.2	3	Consented
Mossy Hill	55.6	12	Application

8.5 The ES for the five-turbine Garth Wind Farm, which is 1.5 km from the Site at its closest point, did not predict any significant effects on birds using the site. The predicted collision mortality rate for red-throated diver was 1 bird every 10-11 years (North Yell Development Council, 2009). This compares with a predicted collision mortality rate of 1 bird every 5.6 to 8.6 years for the Proposed Development. During the operational life of the Garth Wind Farm (30 years) it is estimated that 3 birds could be killed, compared with a worst-case estimate of 5 birds for the Proposed Development. The total impact would therefore be 8 birds in 30 years or 1 bird every 3.75 years, which is a mortality level that not is likely to be discernible against the natural mortality rate within the wider population.

8.6 The assessment for the Beaw Field Wind Farm predicted a negligible effect on all assessed species (Peel Energy, 2016), including whimbrel and red-throated diver. As a negligible effect is predicted for these species it is unlikely that an in-combination effect will occur given that Beaw Field Wind Farm is 15.3 km from the Site. The separation distance between the two wind farm sites leads to the conclusion that they are unlikely to the impacting on the same population of any particular species.

8.7 The assessment for the Gremista Wind Farm also predicted a negligible effect on all assessed species (Amec, 2011), including whimbrel and red-throated diver. As a negligible effect is predicted for these species it is unlikely that an in-combination effect will occur given that Gremista Wind Farm is 53.2 km from the Site.

8.8 No significant residual effects were predicted for any bird species in the Viking Wind Farm ES (Natural Research Projects, 2009), which is 37.3 km from the Site.

8.9 The Mossy Hill Wind Farm ES predicted collision rates of less than one red-throated diver every ten years, and negligible impacts on all other species (Peel Energy, 2018). As this development is more than 55 km away from the Proposed Development it is very unlikely that it will impact on the population of red-throated diver that is resident in north-west Yell.

Assessment of In-Combination Effects

8.10 No significant effects are predicted for any of the wind farms listed above, four of which are considerably further away than the 10 km EZoI that has been adopted for this assessment. Therefore, it is considered unlikely that the residual effects arising as a result of the Proposed Development would be significantly greater when taken in combination with other wind farm developments than in isolation.

8.11 Taking into account the assessments for all of the wind farms identified above, it is concluded that the proposed development will not have an adverse effect on the integrity of Bluemull and Colgrave Sounds pSPA, Otterswick and Graveland SPA, Fetlar SPA, Hermaness and Saxa Vord and Valla Field SPA. All developments include measures that will ensure that effects on SPA and pSPA qualifying features are mitigated.

9 Conclusions

9.1 The Proposed Development is not directly connected with or necessary to the management of any European site (Regulation 63(1)a of the Conservation of Habitats and Species Regulations 2017).

9.2 With reference to Regulation 63 of the Conservation of Habitats and Species Regulations 2017, some aspects of the Proposed Development are considered (on a precautionary basis for screening purposes) likely to have a significant effect on the Bluemull and Colgrave Sounds pSPA, Otterswick and Graveland SPA, Fetlar SPA, and Hermaness and Saxa Vord and Valla Field SPA, when considered alone and in the absence of mitigation. For this reason an 'appropriate assessment' has been carried out. In reaching this conclusion consideration has been given to the implications of the judgment released from the Court of Justice of the European Union 'People Over Wind and Sweetman', 12 April 2018, C-323/17.

9.3 The screening concluded that the Proposed Development is not likely to have an effect on the East Mires and Lumbister SAC as no impact mechanism has been identified for this European site. As a result this European site has been excluded from the appropriate assessment.

9.4 The appropriate assessment has considered impacts on all habitats and species associated with the Bluemull and Colgrave Sounds pSPA, Otterswick and Graveland SPA, Fetlar SPA, and Hermaness and Saxa Vord and Valla Field SPA (irrespective of whether or not they are qualifying features) if impacts on those habitats and species are liable to affect the conservation objectives of the site. This takes into account the direction provided by a second recent HRA judgment (Holohan & Ors. v An Bord Pleanála, 7 November 2018, C - 461/17).

9.5 The results of desk study and survey have led to the conclusion that land within the Proposed Development is functionally linked with the Bluemull and Colgrave Sounds pSPA for red-throated diver, and that it is functionally linked with the Fetlar SPA for dunlin. The assessment has concluded that the proposed measures will mitigate effects on the populations of both red-throated diver and dunlin using the Site. These mitigation measures take into account impacts on supporting habitats (irrespective of whether or not they are qualifying features, as required by Holohan & Ors. v An Bord Pleanála, 7 November 2018, C - 461/17.

9.6 With regard to all identified effects it is concluded that, in view of the site's conservation objectives and applying best scientific knowledge, there is not likely to be an adverse effect on the integrity of any European site due to the Proposed Development. The Proposed Development will not impact directly on Bluemull and Colgrave Sounds pSPA, Otterswick and Graveland SPA, Fetlar SPA, and Hermaness and Saxa Vord and Valla Field SPA.

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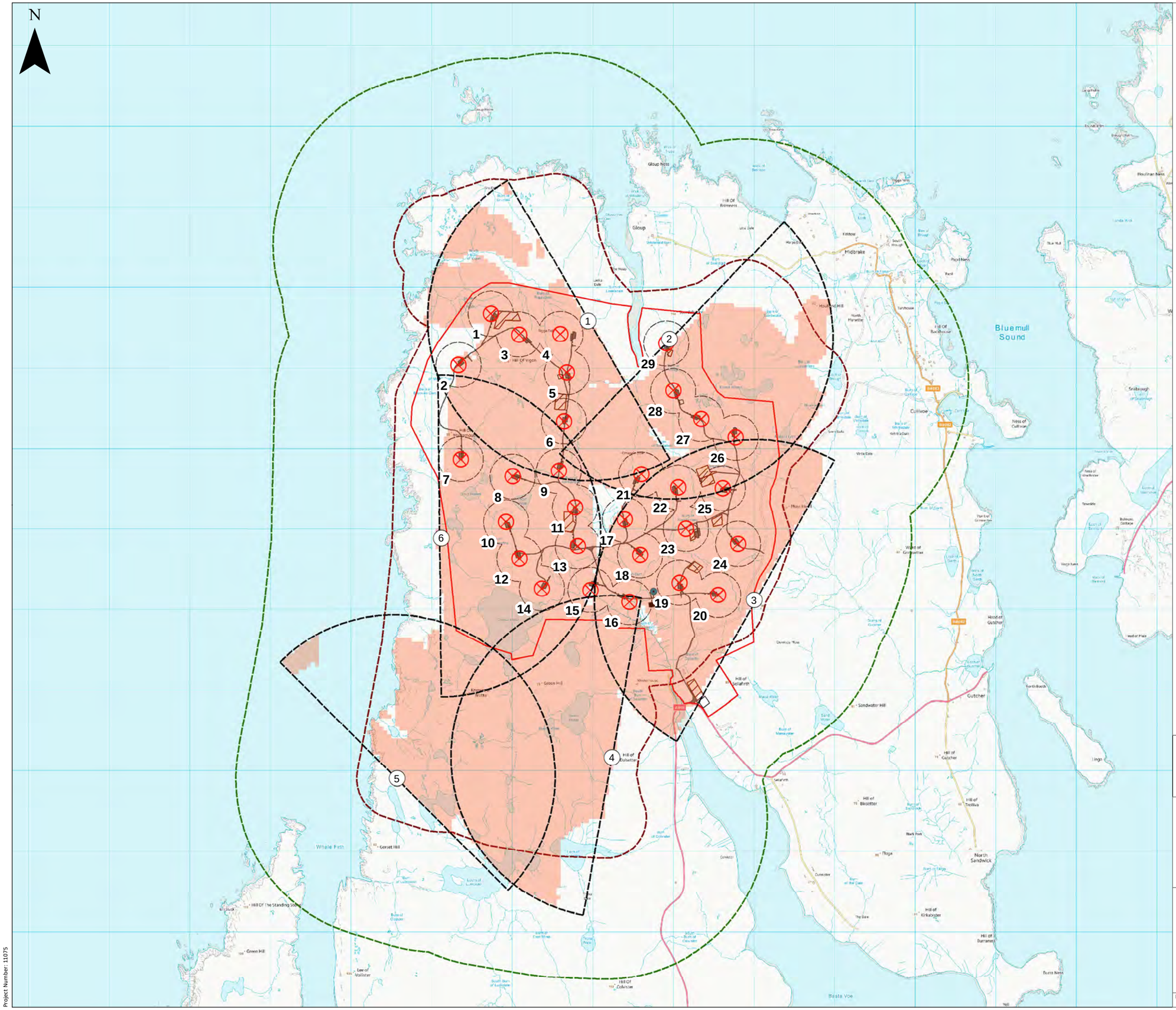
11 Figures



KEY

- Site Boundary
- Turbine locations
- 280 m radius from turbine locations
- Moorland Breeding Bird Survey Area
- Breeding Raptor Survey Area

Infrastructure

- Met mast
- Substation
- Site compound
- Access track and hardstanding
- Borrow pits

Vantage point surveys

- Vantage point location
- 2 km 180° viewsheds
- Modelled visibility from vantage point locations

0 0.65 1.3 1.95 km

Scale 1:45,000 @ A3

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Energy Isles Wind Farm
HRA

Figure 1
Vantage point locations and survey areas

Date:	Drawn by:	Checked by:	Version:
28/03/2019	COH	GL	V1

Project Number: 11075

KEY

- Site Boundary
- Turbine locations
- 280 m radius from turbine locations
- Red-throated diver breeding survey area
- Vantage point location

Infrastructure

- Met mast
- Substation
- Site compound
- Access track and hardstanding
- Borrow pits

0 0.5 1 1.5 km

Scale 1:40,000 @ A3

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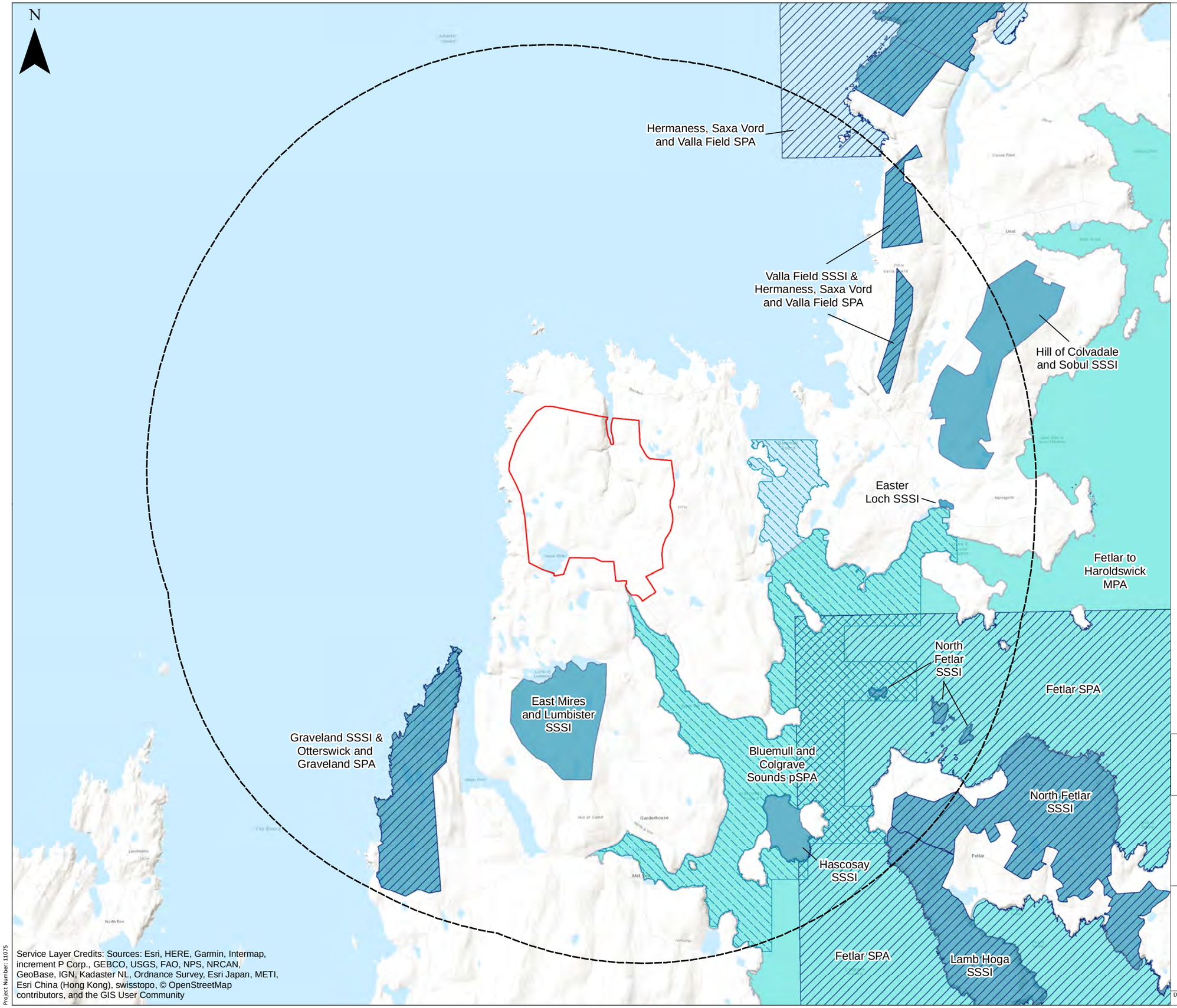
Figure 2
Red-throated diver survey area and vantage point locations

Date:	Drawn by:	Checked by:	Version:
28/03/2019	COH	GL	V1

Project Number: 11075



KEY

- Site Boundary
- 10 km radius from Site Boundary
- Site of Special Scientific Interest (SSSI)
- Special Protection Area (SPA)
- Proposed Special Protection Area (pSPA)
- Nature Conservation Marine Protected Areas (MPA)

0 1 2 3 4 5 km

Scale 1:100,000 @ A3

Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

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Figure 3
Location of Designated Sites within 10 km of the Site

Date:	Drawn by:	Checked by:	Version:
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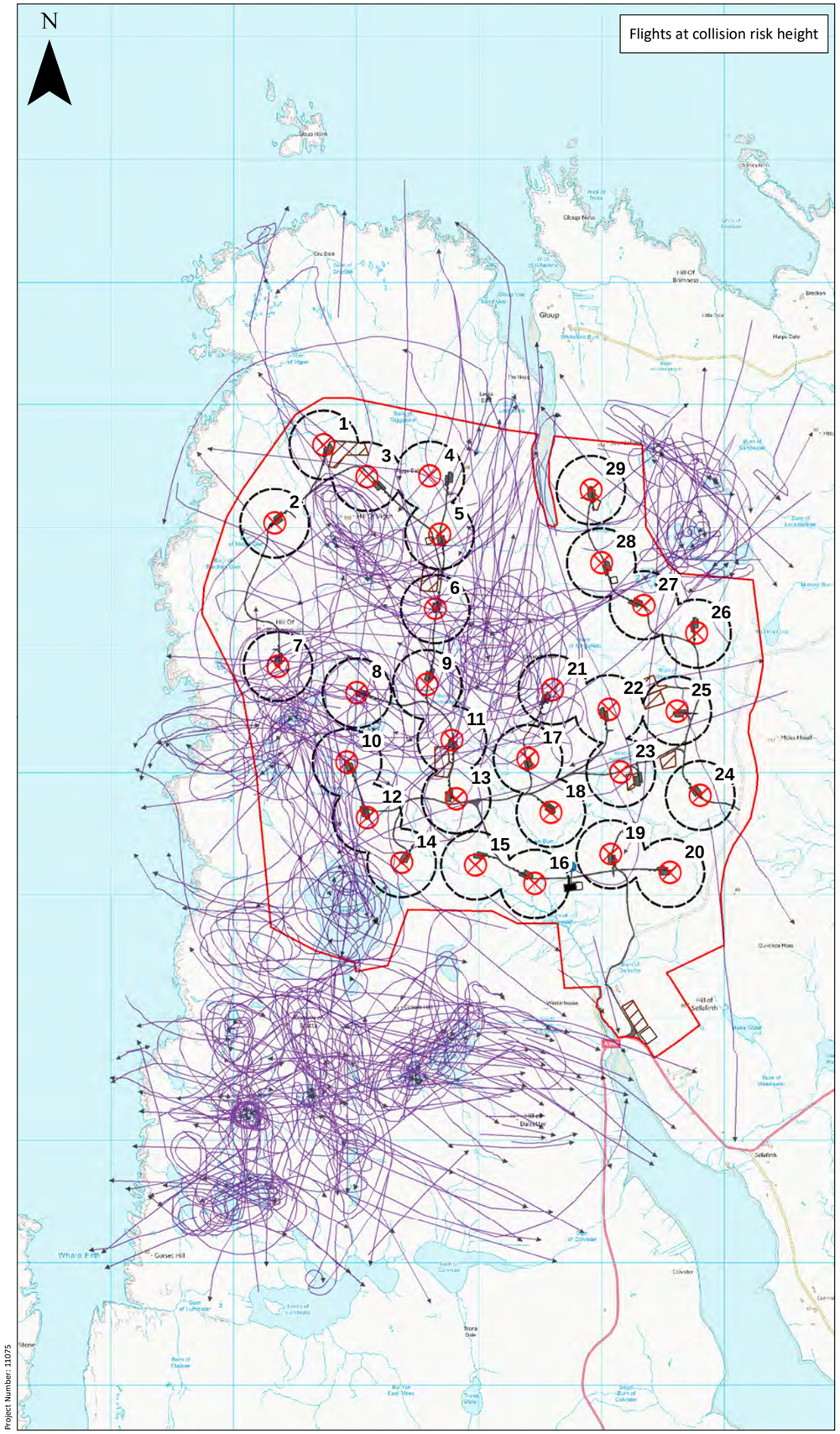

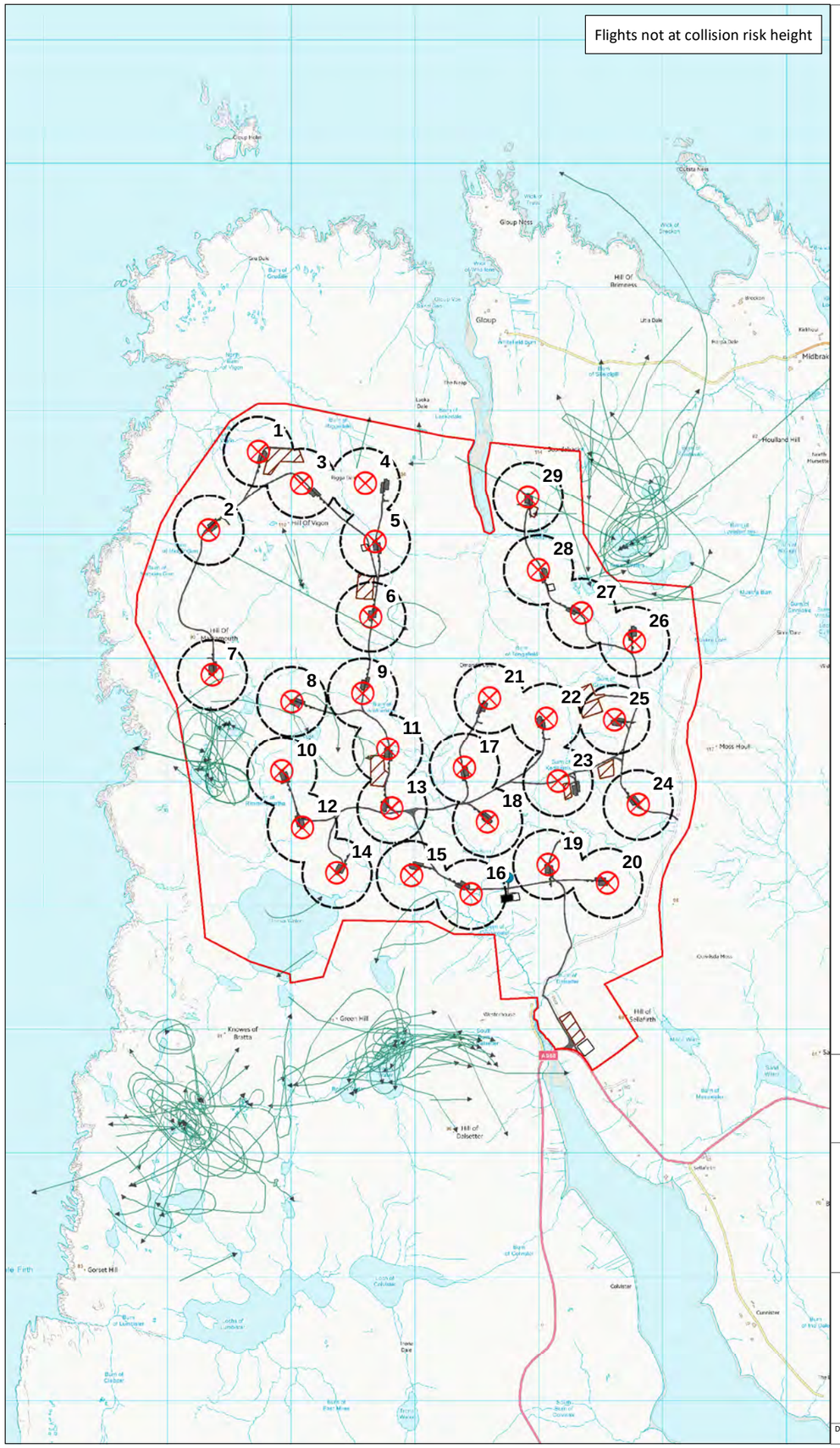

KEY

- Site Boundary
- Turbine locations
- 280 m radius from turbine locations

Infrastructure

- Met mast
- Substation
- Site compound
- Access track and hardstanding
- Borrow pits

Red-throated diver

- Flights at collision risk height
- Flights not at collision risk height

0 0.5 1 km

Scale 1:42,000 @ A3

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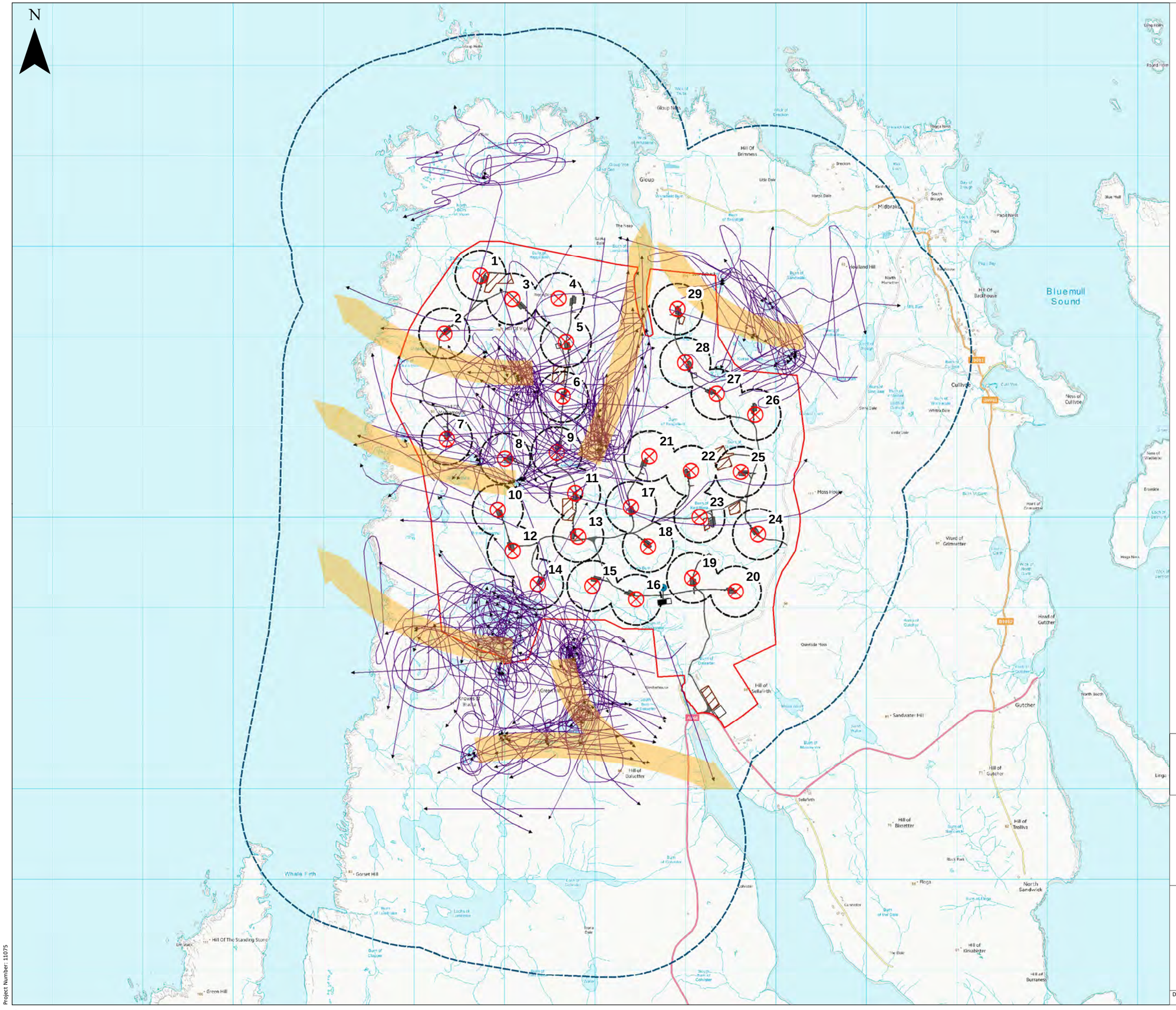
Figure 4

Red-throated diver flights

Date:	Drawn by:	Checked by:	Version:
28/03/2019	COH	GL	V1

Project Number: 11075



KEY

- 🟥 Site Boundary
- ⊗ Turbine locations
- ⬚ 280 m radius from turbine locations
- ⬚ Red-throated diver breeding survey area

Infrastructure

- ● Met mast
- ■ Substation
- □ Site compound
- ■ Access track and hardstanding
- ▨ Borrow pits

Red-throated diver

- ➡ Indicative flightline aggregated from flights recorded during focal breeding lochan survey
- → Flights recorded during focal breeding lochan survey

0 0.7 1.4 km

Scale 1:40,000 @ A3

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Figure 5
Red-throated diver flights recorded during breeding lochan surveys

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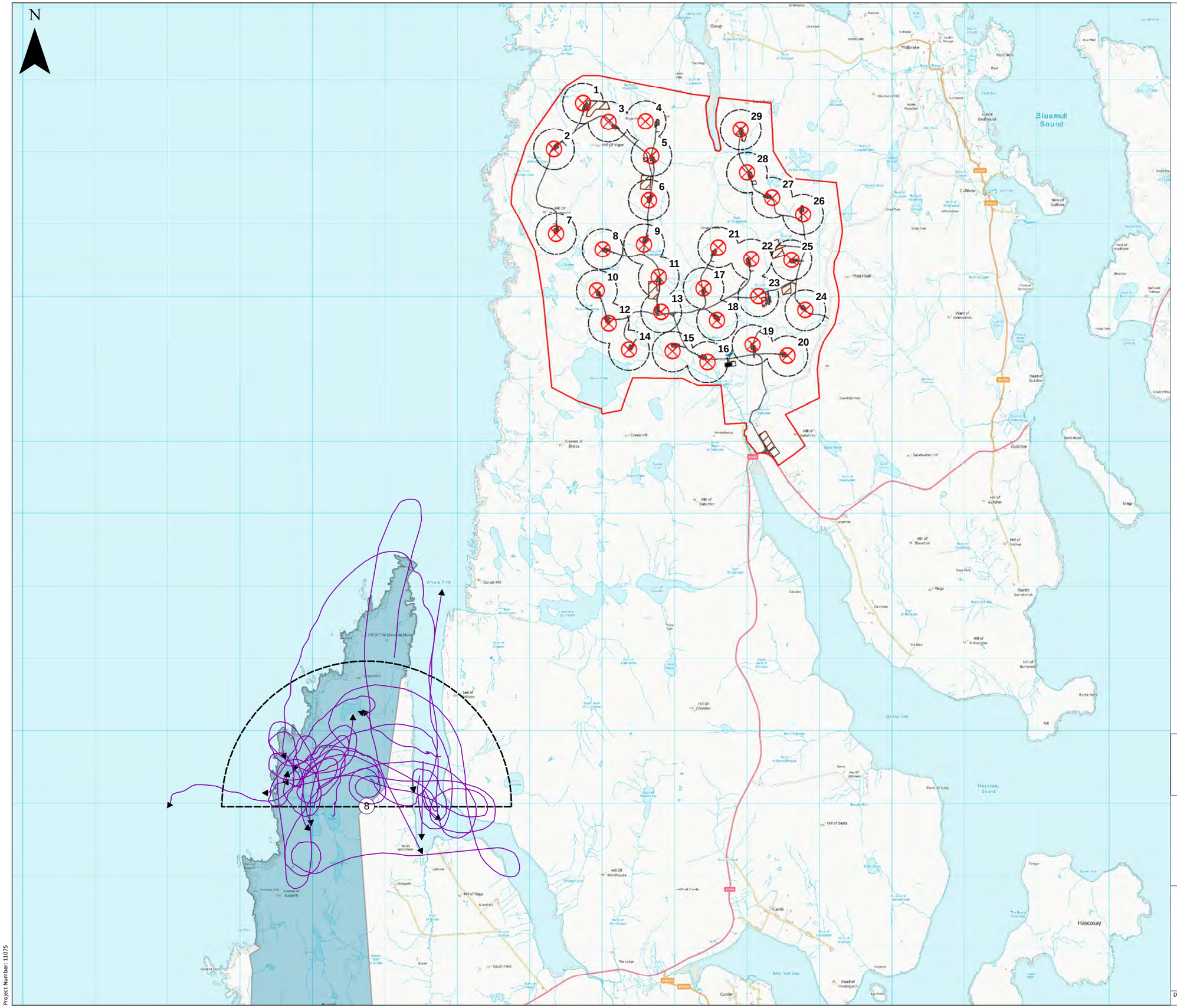
Project Number: 11075



KEY

- Site Boundary
- Turbine locations
- 280 m radius from turbine locations

Infrastructure

- Met mast
- Substation
- Site compound
- Access track and hardstanding
- Borrow pits

Red-throated diver

- Flights at collision risk height
- Graveland SSSI & Otterswick and Graveland SPA
- (8) Vantage point location
- 2 km 180° viewshed

0 0.85 1.7 km

Scale 1:50,000 @ A3

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Figure 6
Red-throated diver flights recorded from the Otterswick and Graveland SPA

Date:	Drawn by:	Checked by:	Version:
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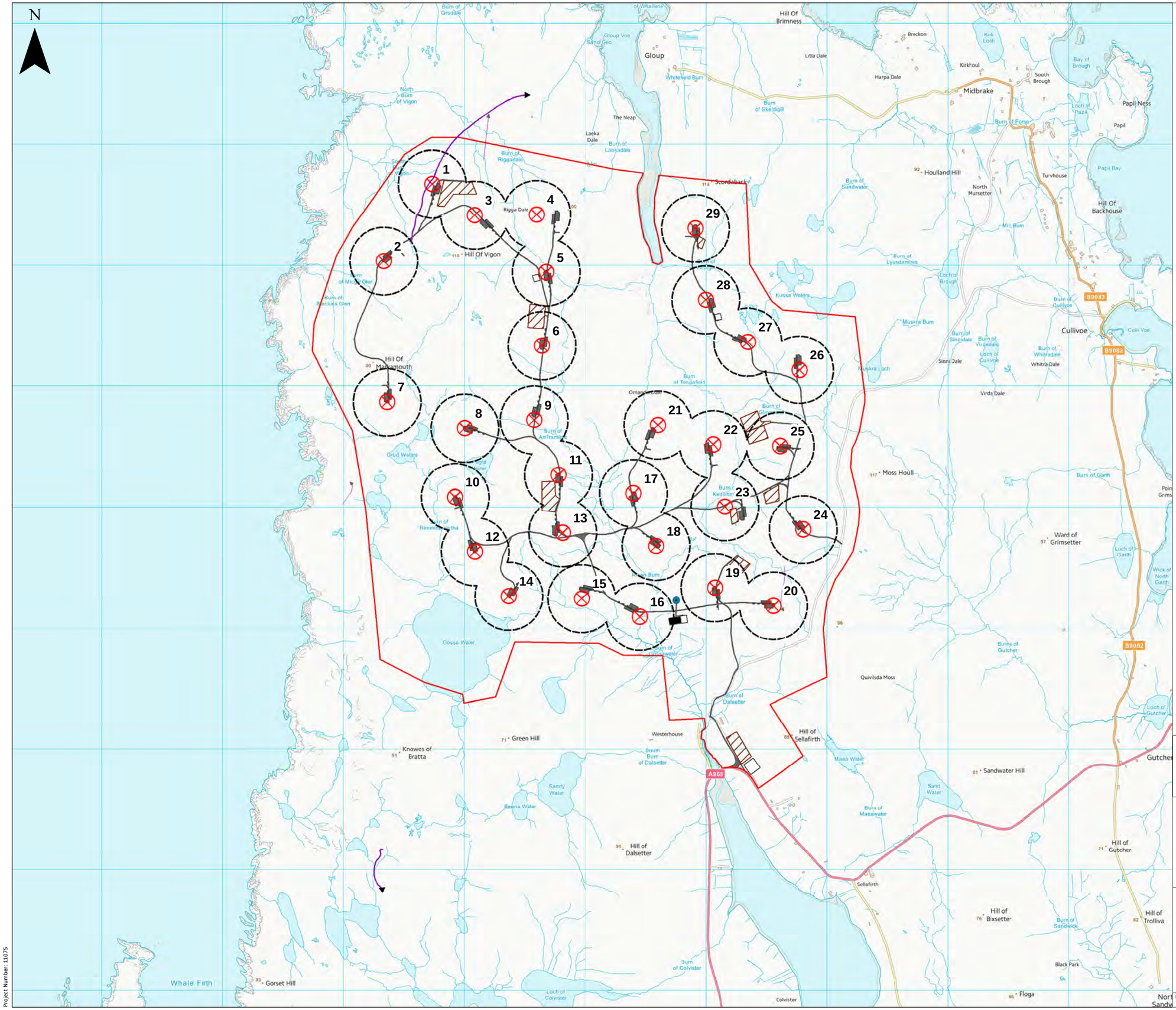
Project Number: 11075



KEY

- Site Boundary
- Turbine locations
- 280 m radius from turbine locations

Infrastructure

- Met mast
- Substation
- Site compound
- Access track and hardstanding
- Borrow pits

Whimbrel flights

- Flights at collision risk height
- Flights not at collision risk height

0 0.5 1 km

Scale 1:30,000 @ A3

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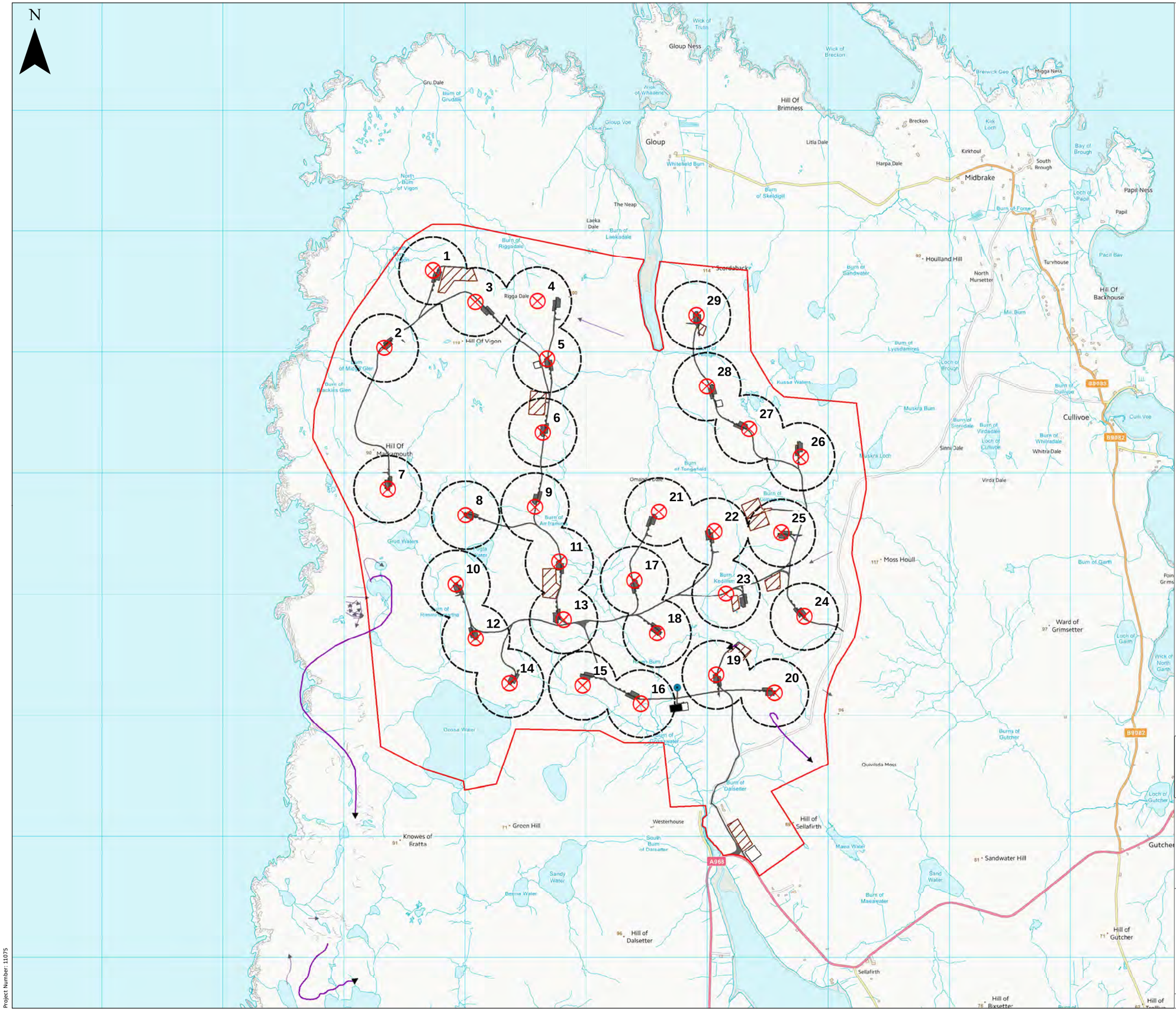
Figure 7

Whimbrel flights

Date:	Drawn by:	Checked by:	Version:
28/03/2019	COH	GL	V1

Project Number: 11075



KEY

- Site Boundary
- Turbine locations
- 280 m radius from turbine locations

Infrastructure

- Met mast
- Substation
- Site compound
- Access track and hardstanding
- Borrow pits

Dunlin

- Flights at collision risk height
- Flights not at collision risk height

0 0.5 1 km

Scale 1:30,000 @ A3

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Figure 8

Dunlin flights

Date:	Drawn by:	Checked by:	Version:
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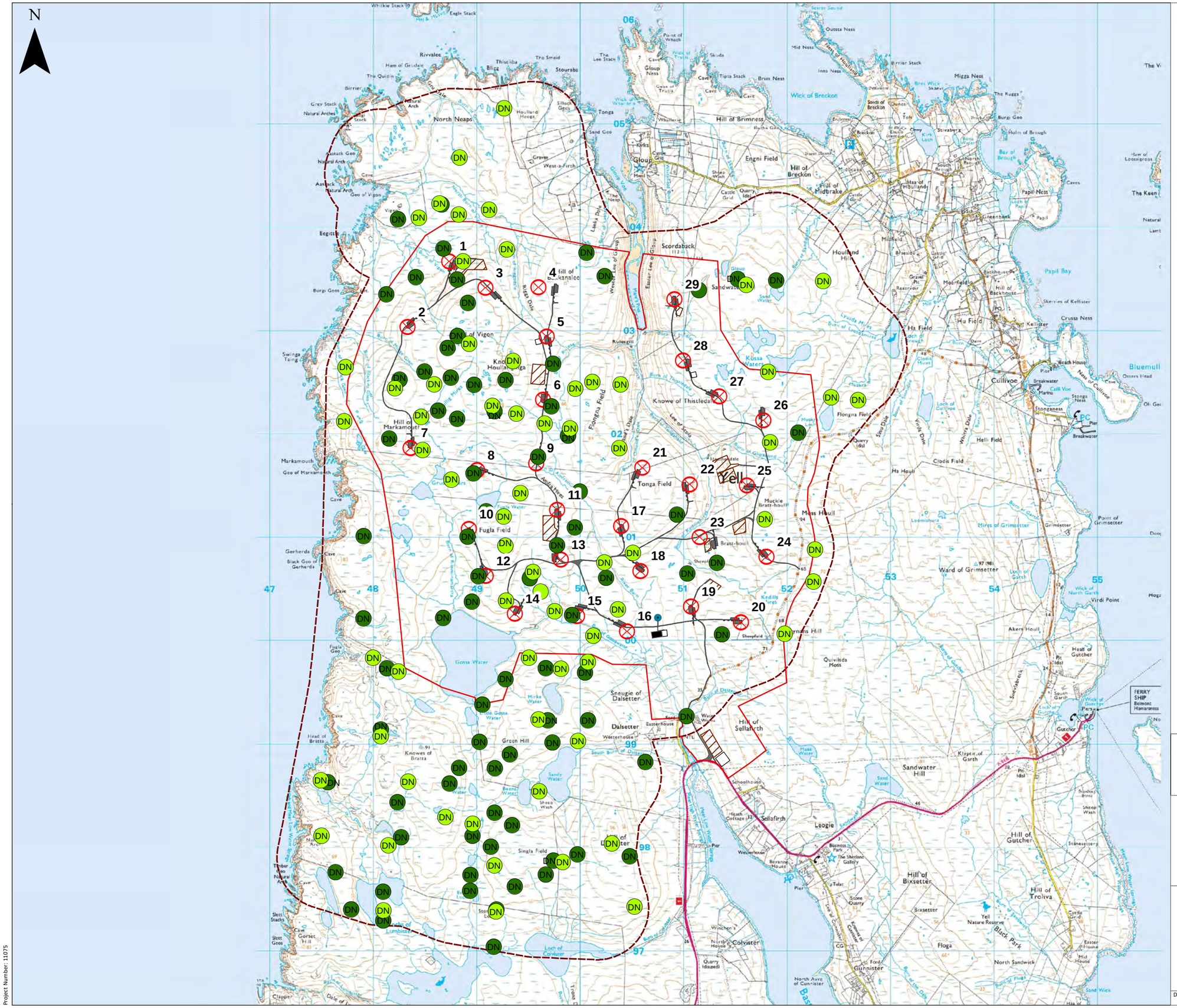
Project Number: 11075



KEY

🟥 Site Boundary

⊗ Turbine locations

▭ Moorland Breeding Bird Survey Area

Infrastructure

● Met mast

■ Substation

□ Site compound

■ Access track and hardstanding

▨ Borrow pits

Dunlin

DN Breeding season 2016

DN Breeding season 2018

0 0.5 1 1.5 km

Scale 1:35,000 @ A3

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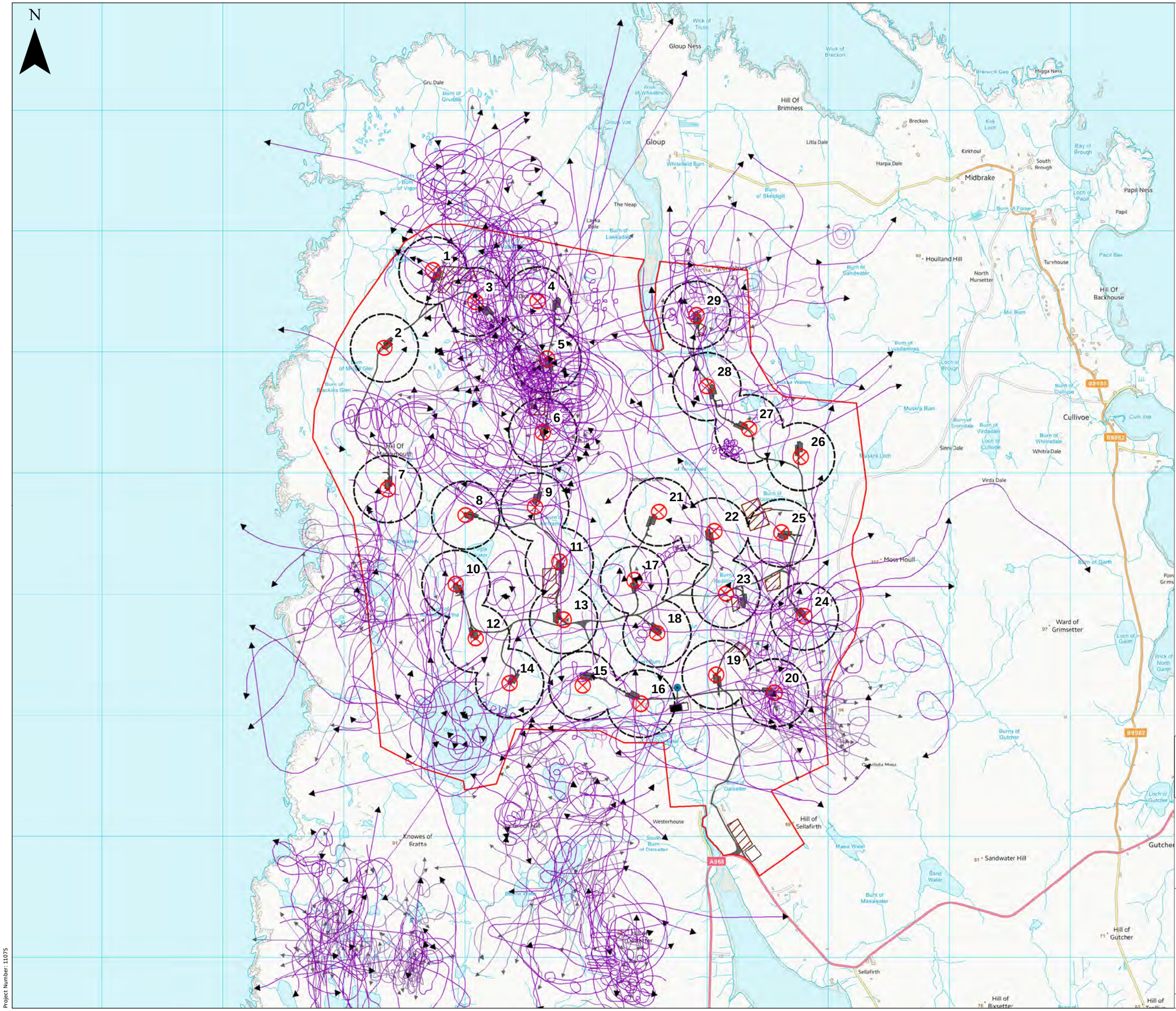
Figure 9

Dunlin territories

Date:	Drawn by:	Checked by:	Version:
28/03/2019	COH	GL	V1

Project Number: 11075



KEY

- Site Boundary
- Turbine locations
- 280 m radius from turbine locations

Infrastructure

- Met mast
- Substation
- Site compound
- Access track and hardstanding
- Borrow pits

Great skua

- Flights at collision risk height
- Flights not at collision risk height

0 0.5 1 km

Scale 1:30,000 @ A3

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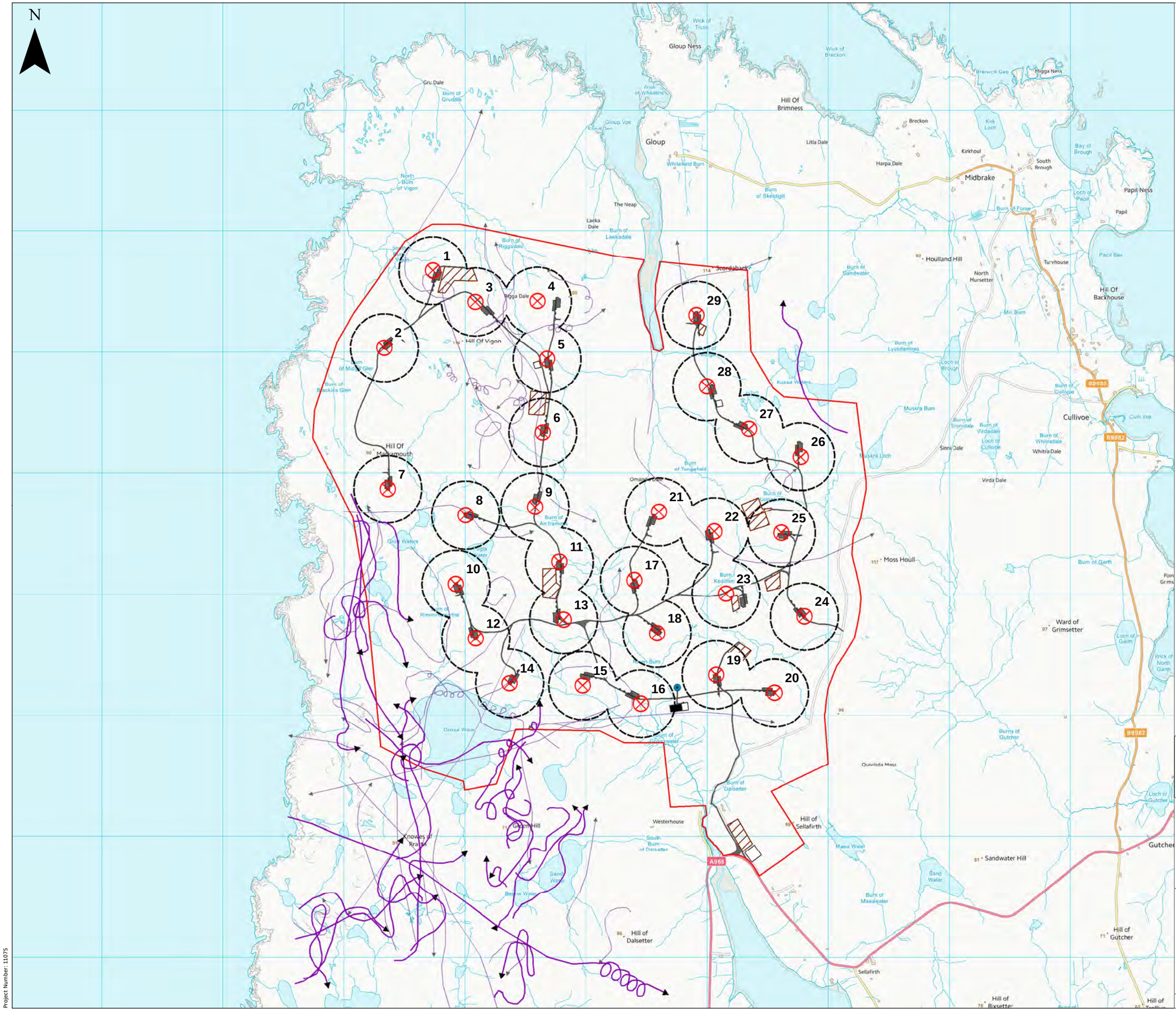
Figure 10

Great skua flights (2016 breeding season)

Date:	Drawn by:	Checked by:	Version:
28/03/2019	COH	GL	V1

Project Number: 11075



KEY

- Site Boundary
- Turbine locations
- 280 m radius from turbine locations

Infrastructure

- Met mast
- Substation
- Site compound
- Access track and hardstanding
- Borrow pits

Great skua

- Flights at collision risk height
- Flights not at collision risk height

0 0.5 1 km

Scale 1:30,000 @ A3

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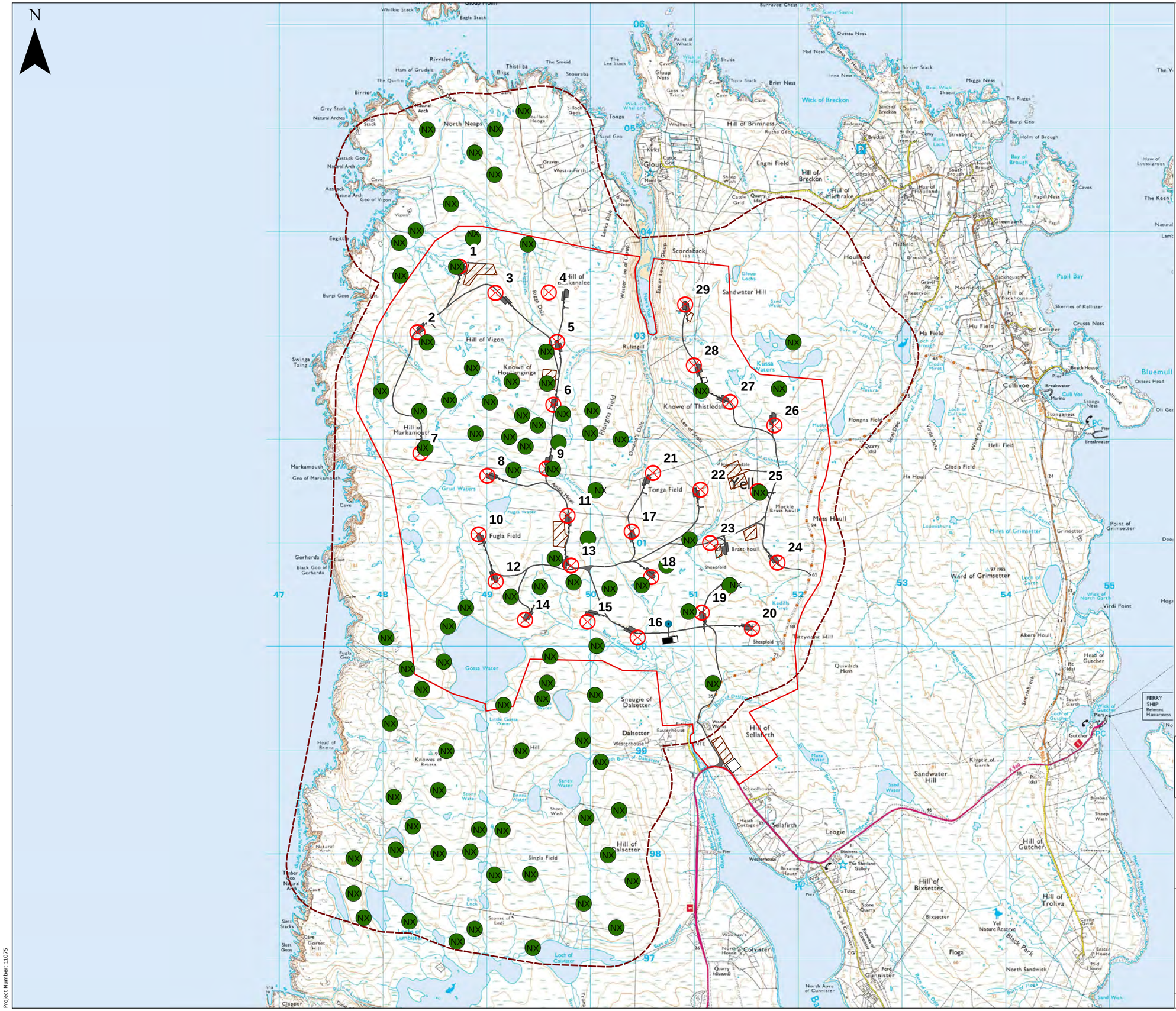
Figure 11

Great skua flights (2017/18 winter season)

Date:	Drawn by:	Checked by:	Version:
28/03/2019	COH	GL	V1

Project Number: 11075



KEY

- Site Boundary
- Turbine locations
- Moorland Breeding Bird Survey Area

Infrastructure

- Met mast
- Substation
- Site compound
- Access track and hardstanding
- Borrow pits

Great skua

- Breeding season 2018

0 0.5 1 1.5 km

Scale 1:35,000 @ A3

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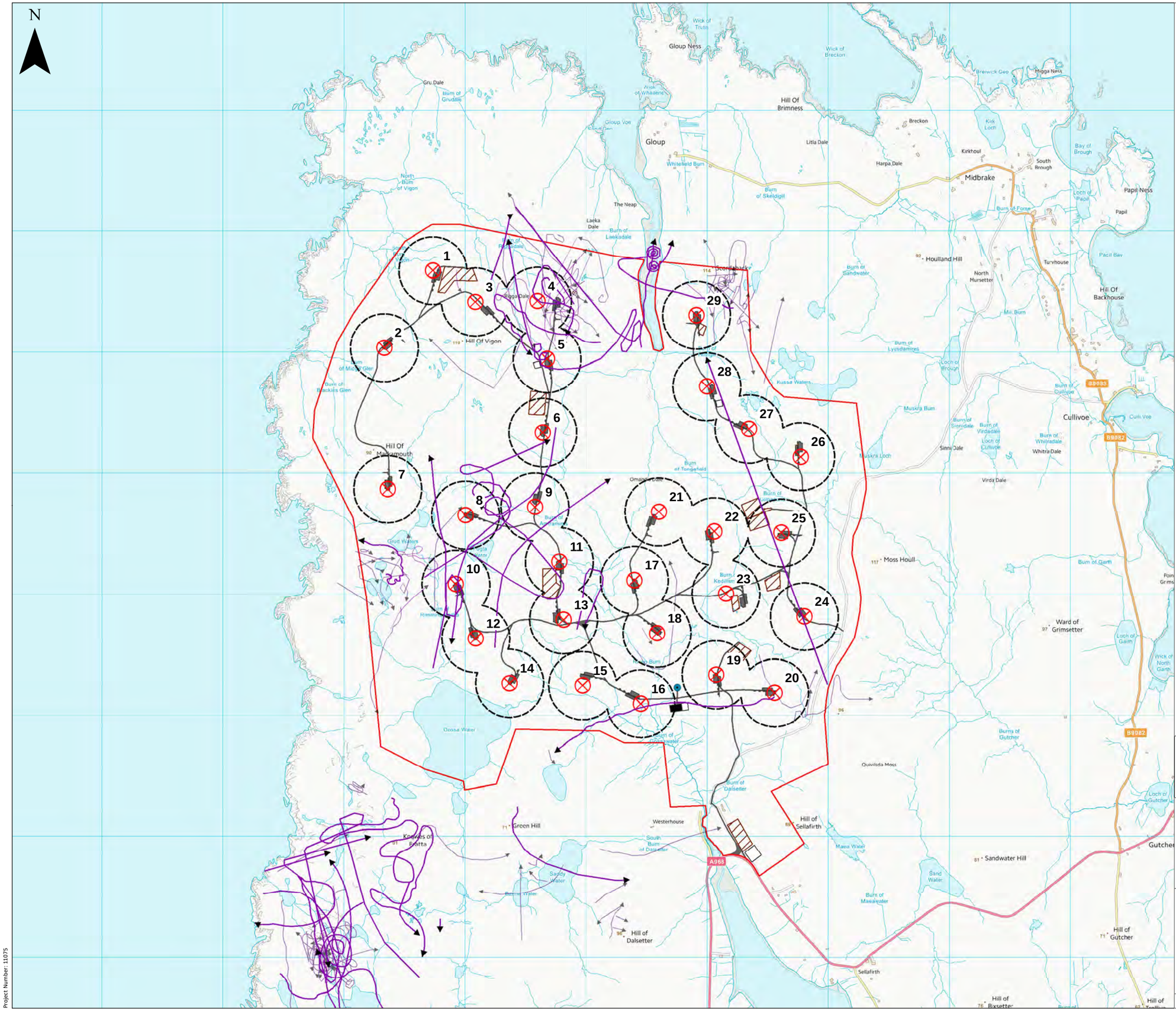
Figure 12

Great skua territories

Date:	Drawn by:	Checked by:	Version:
28/03/2019	COH	GL	V1

Project Number: 11075



KEY

- Site Boundary
- Turbine locations
- 280 m radius from turbine locations

Infrastructure

- Met mast
- Substation
- Site compound
- Access track and hardstanding
- Borrow pits

Arctic skua

- Flights at collision risk height
- Flights not at collision risk height

0 0.5 1 km

Scale 1:30,000 @ A3

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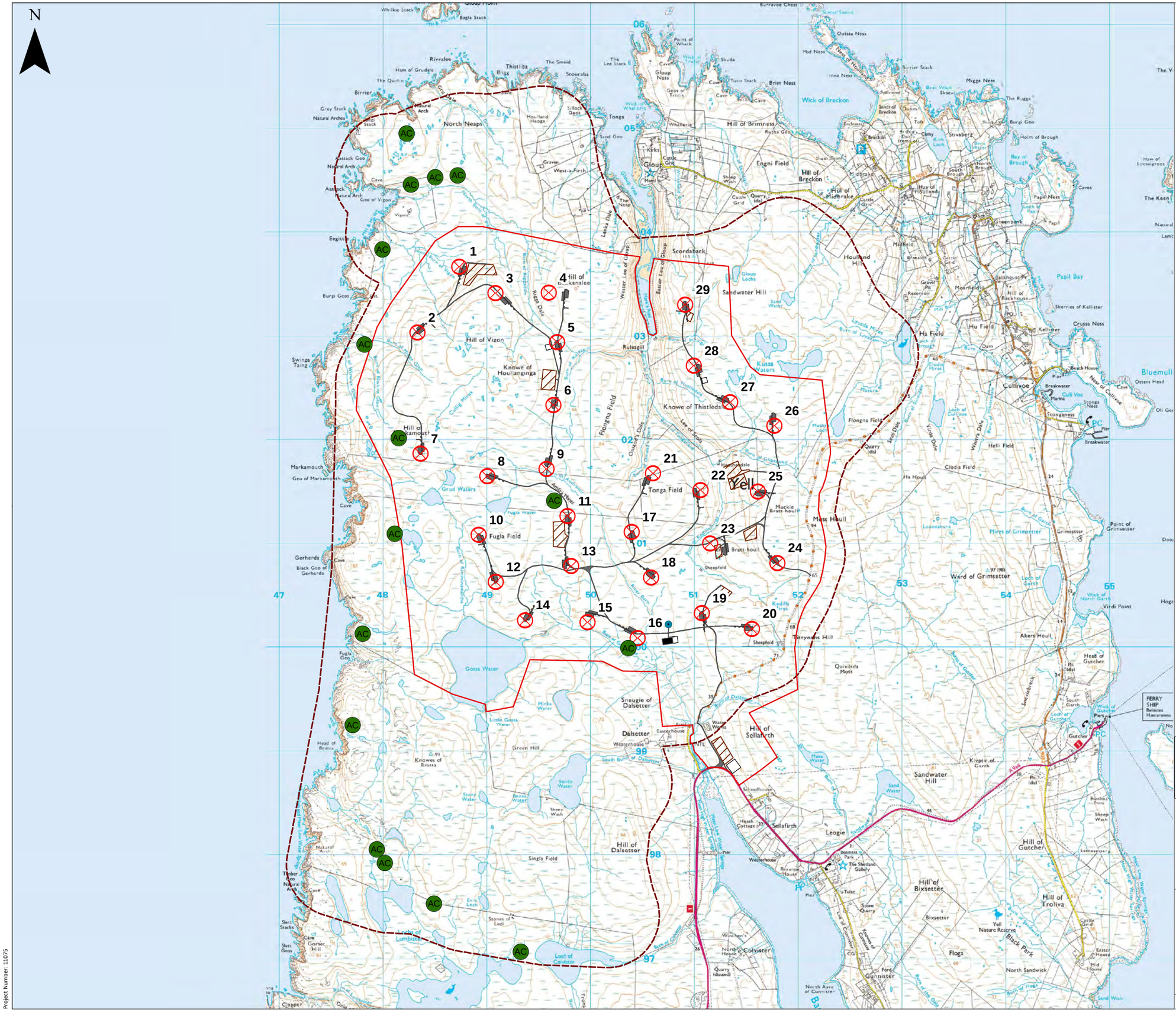
Figure 13

Arctic skua flights

Date:	Drawn by:	Checked by:	Version:
28/03/2019	COH	GL	V1

Project Number: 11075



KEY

- Site Boundary
- Turbine locations
- Moorland Breeding Bird Survey Area

Infrastructure

- Met mast
- Substation
- Site compound
- Access track and hardstanding
- Borrow pits

Arctic skua

- Breeding season 2018

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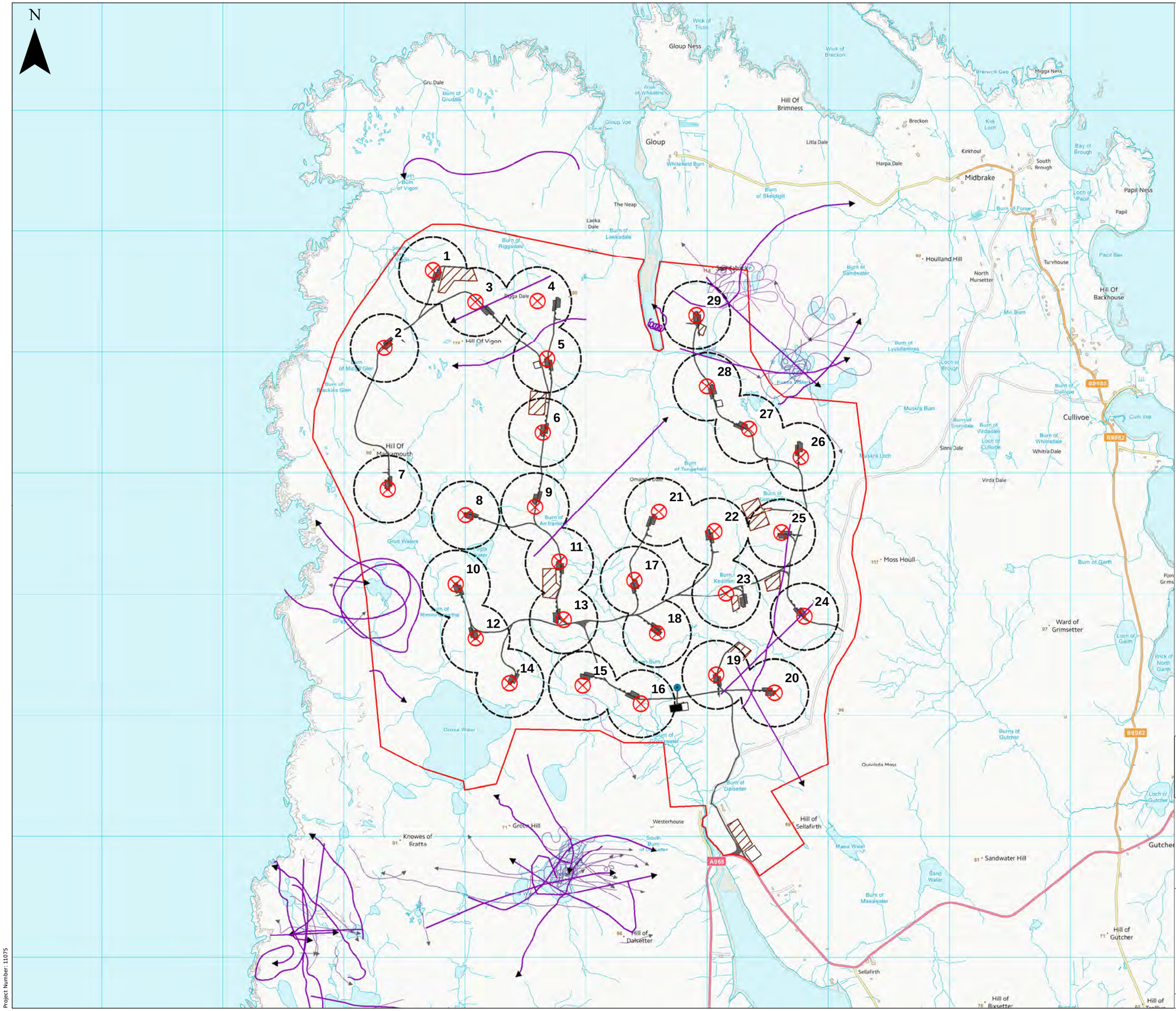
Figure 14

Arctic skua territories

Date:	Drawn by:	Checked by:	Version:
28/03/2019	COH	GL	V1

Project Number: 11075



KEY

- Site Boundary
- Turbine locations
- 280 m radius from turbine locations

Infrastructure

- Met mast
- Substation
- Site compound
- Access track and hardstanding
- Borrow pits

Arctic tern

- Flights at collision risk height
- Flights not at collision risk height

0 0.5 1 km

Scale 1:30,000 @ A3

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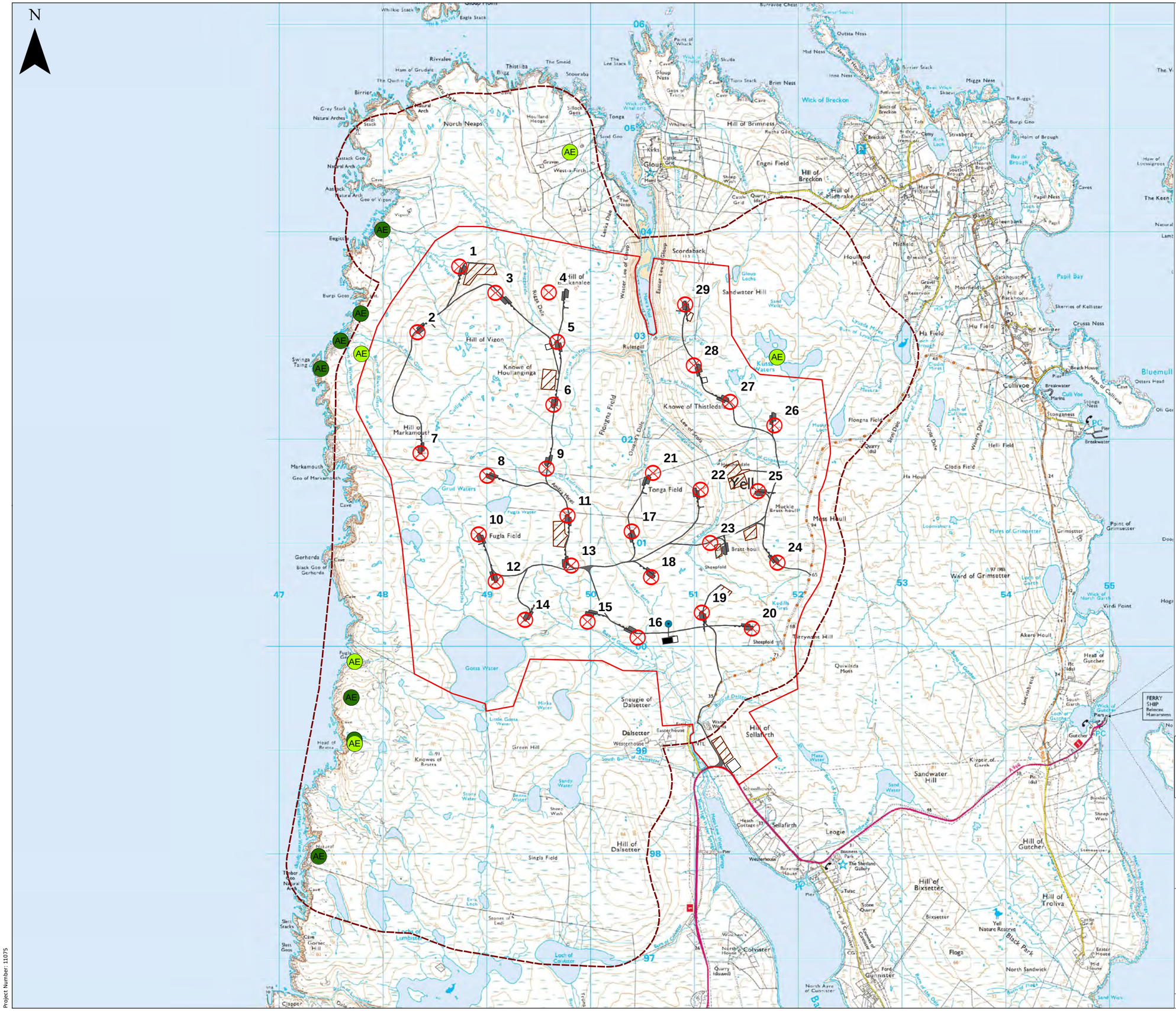
Figure 15

Arctic tern flights

Date:	Drawn by:	Checked by:	Version:
28/03/2019	COH	GL	V1

Project Number: 11075



KEY

- Site Boundary
- Turbine locations
- Moorland Breeding Bird Survey Area

Infrastructure

- Met mast
- Substation
- Site compound
- Access track and hardstanding
- Borrow pits

Arctic tern

- AE Breeding season 2016
- AE Breeding season 2018

0 0.5 1 1.5 km

Scale 1:35,000 @ A3

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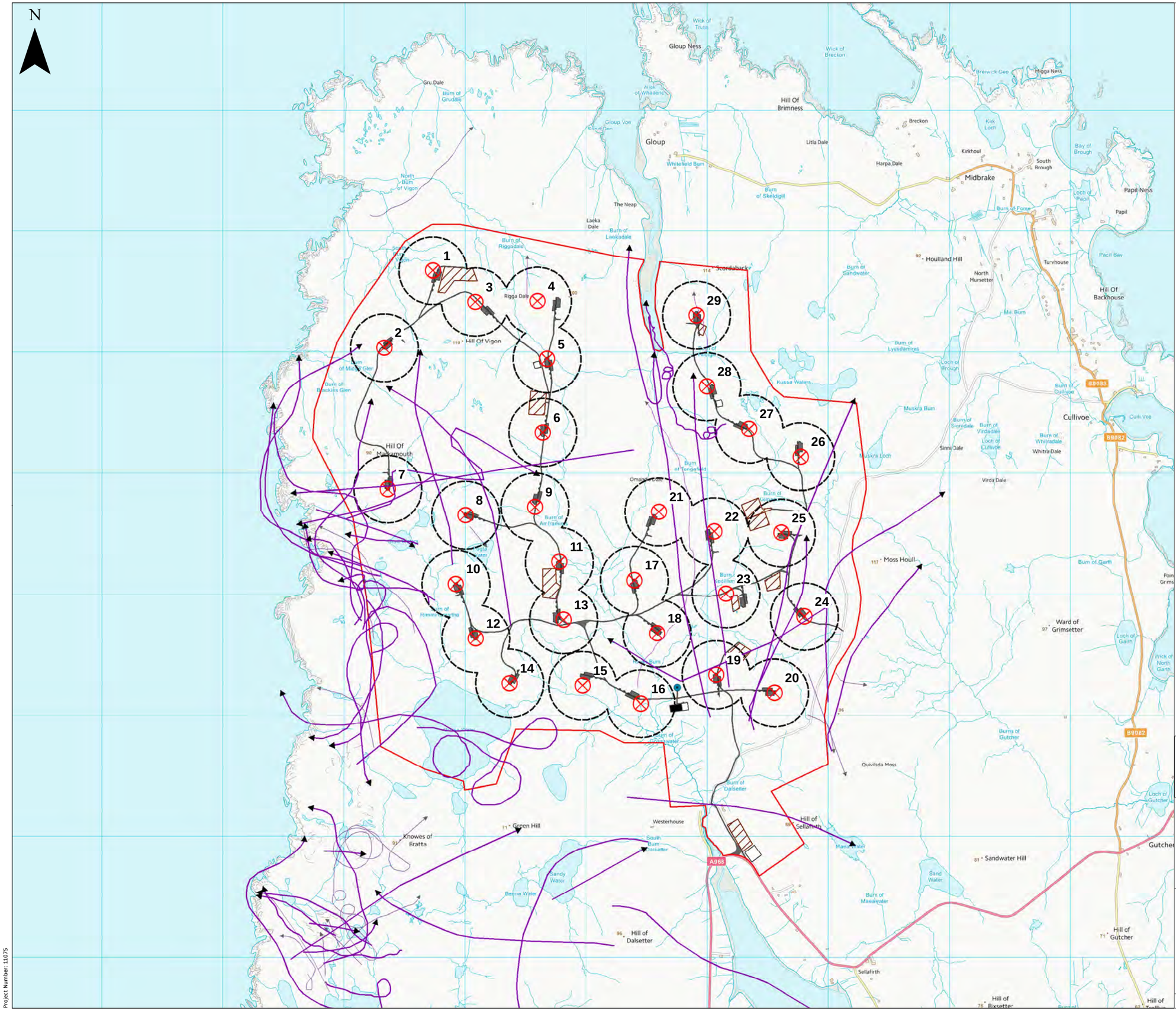
Figure 16

Arctic tern territories

Date:	Drawn by:	Checked by:	Version:
28/03/2019	COH	GL	V1

Project Number: 11075



KEY

- Site Boundary
- Turbine locations
- 280 m radius from turbine locations

Infrastructure

- Met mast
- Substation
- Site compound
- Access track and hardstanding
- Borrow pits

Fulmar

- Flights at collision risk height
- Flights not at collision risk height

0 0.5 1 km

Scale 1:30,000 @ A3

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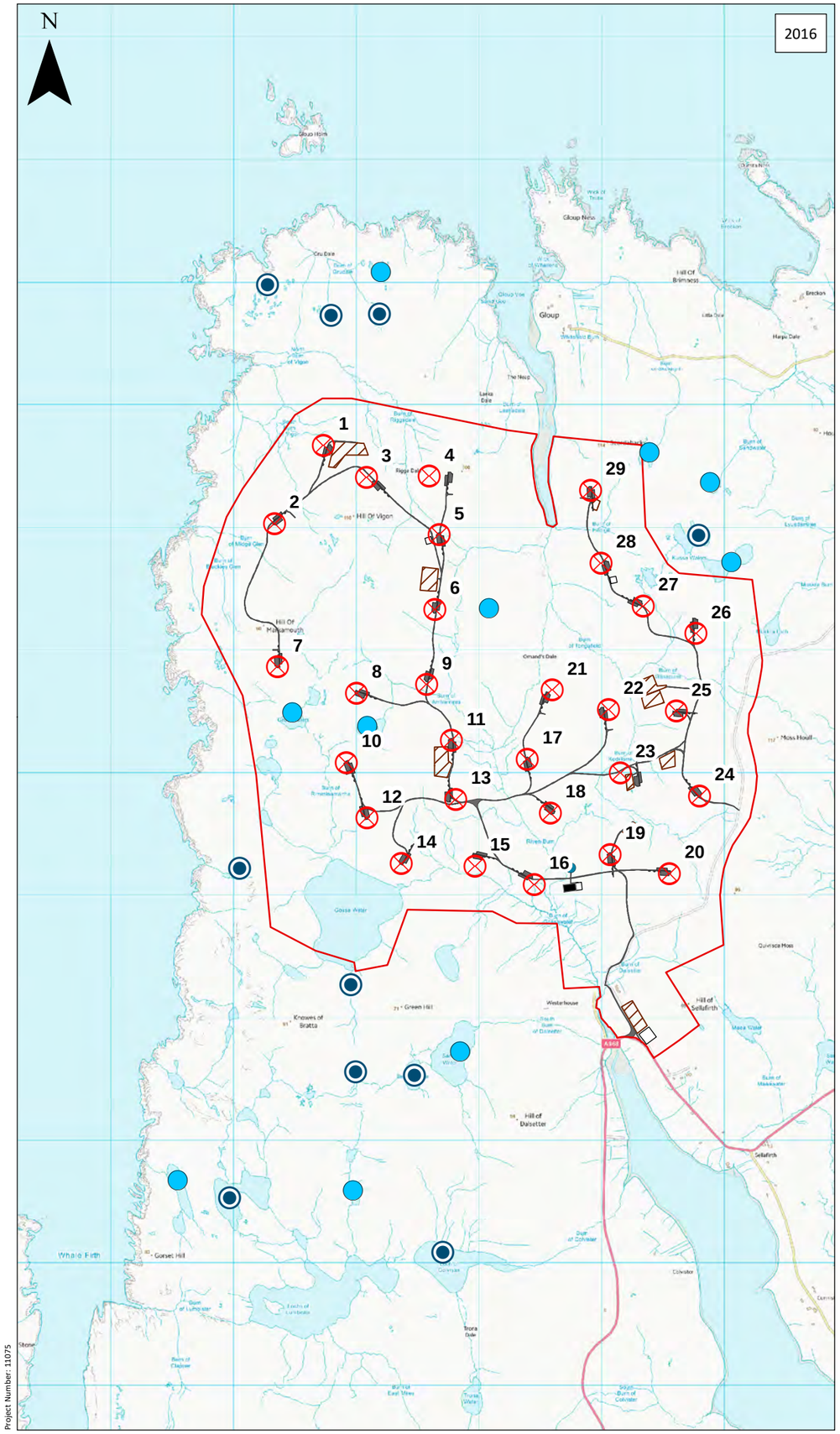
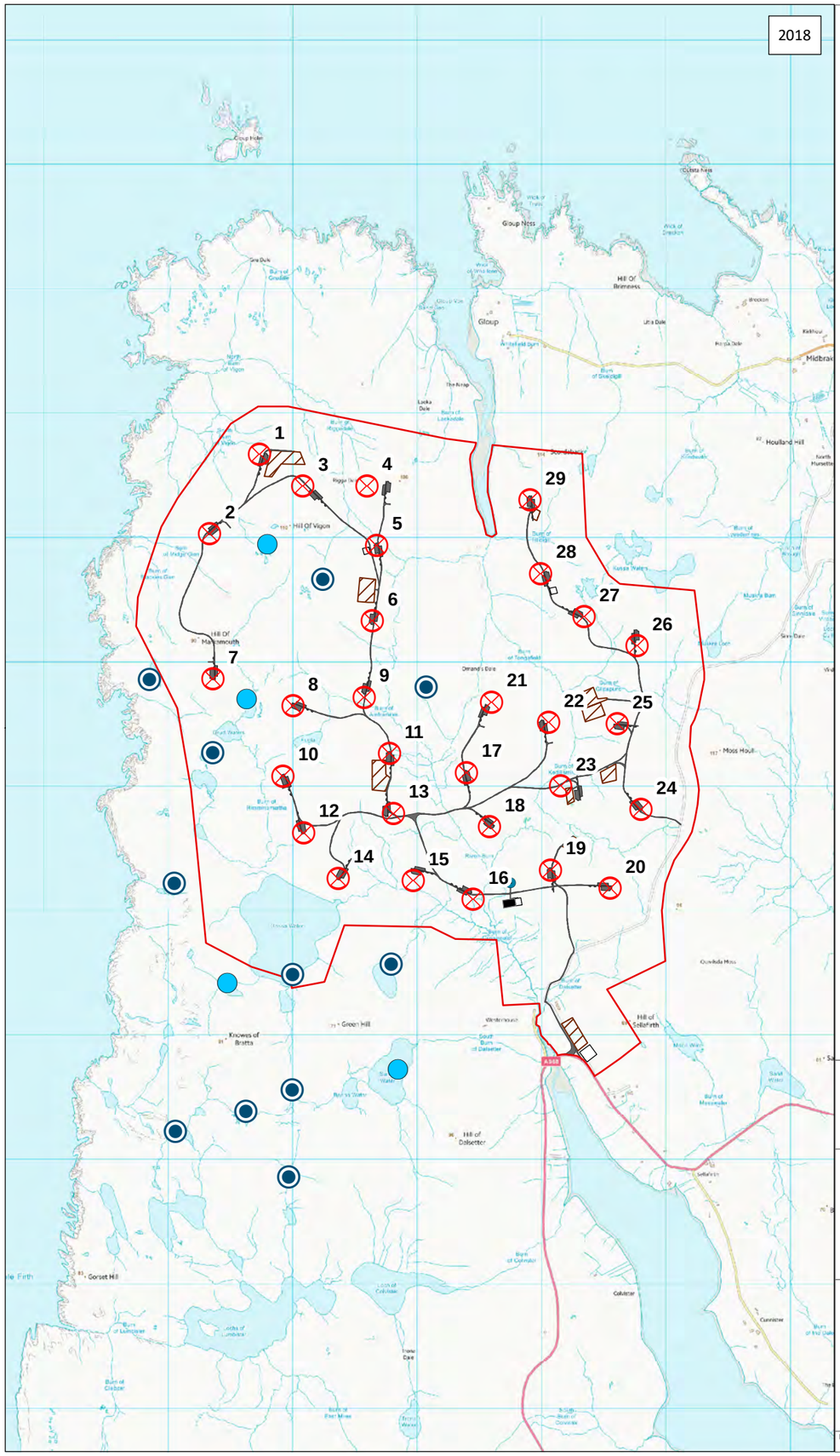
Figure 17

Fulmar flights

Date:	Drawn by:	Checked by:	Version:
28/03/2019	COH	GL	V1

Project Number: 11075





KEY

- Site Boundary
- Turbine locations

Infrastructure

- Met mast
- Substation
- Site compound
- Access track and hardstanding
- Borrow pits

Red-throated diver breeding lochan locations

- Confirmed
- Unconfirmed

0 0.5 1 km

Scale 1:42,000 @ A3

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Figure 18
Red-throated diver breeding lochans
(CONFIDENTIAL)

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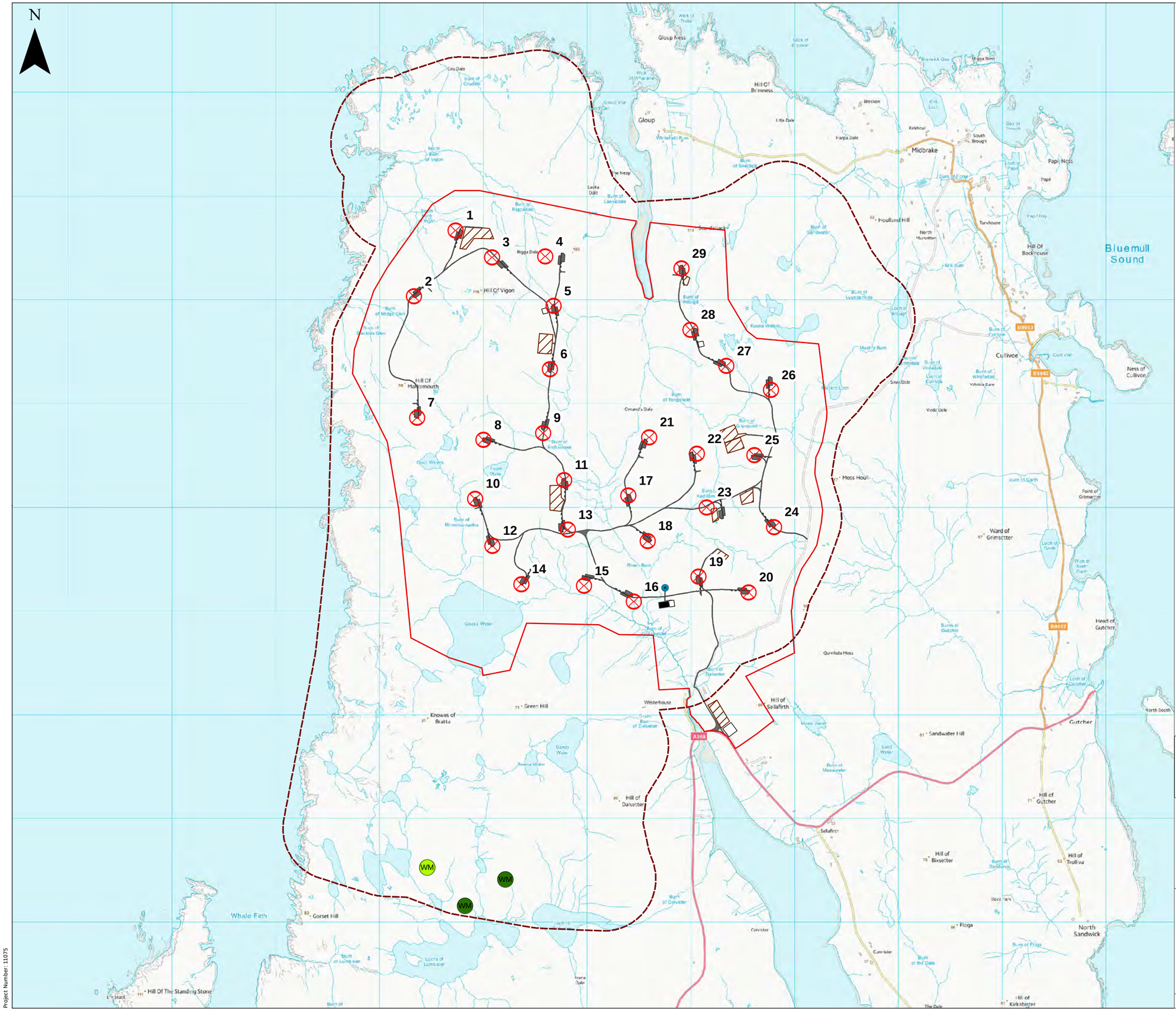
28/03/2019	COH	GL	V1

Project Number: 11075



KEY

- Site Boundary
- Turbine locations
- Moorland Breeding Bird Survey Area

Infrastructure

- Met mast
- Substation
- Site compound
- Access track and hardstanding
- Borrow pits

Whimbrel territories

- WM Breeding season 2016
- WM Breeding season 2018

0 0.5 1 1.5 km

Scale 1:35,000 @ A3

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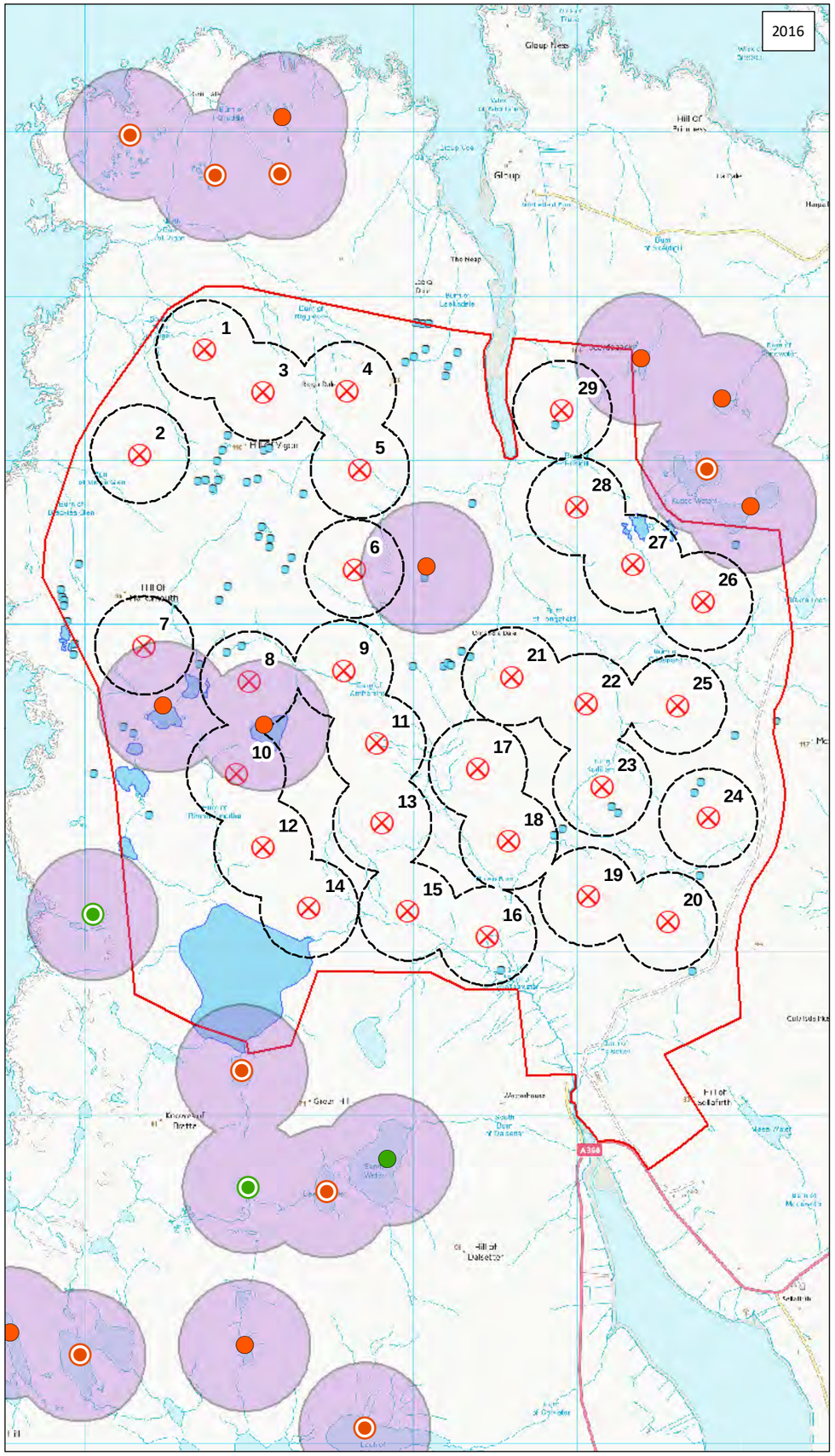
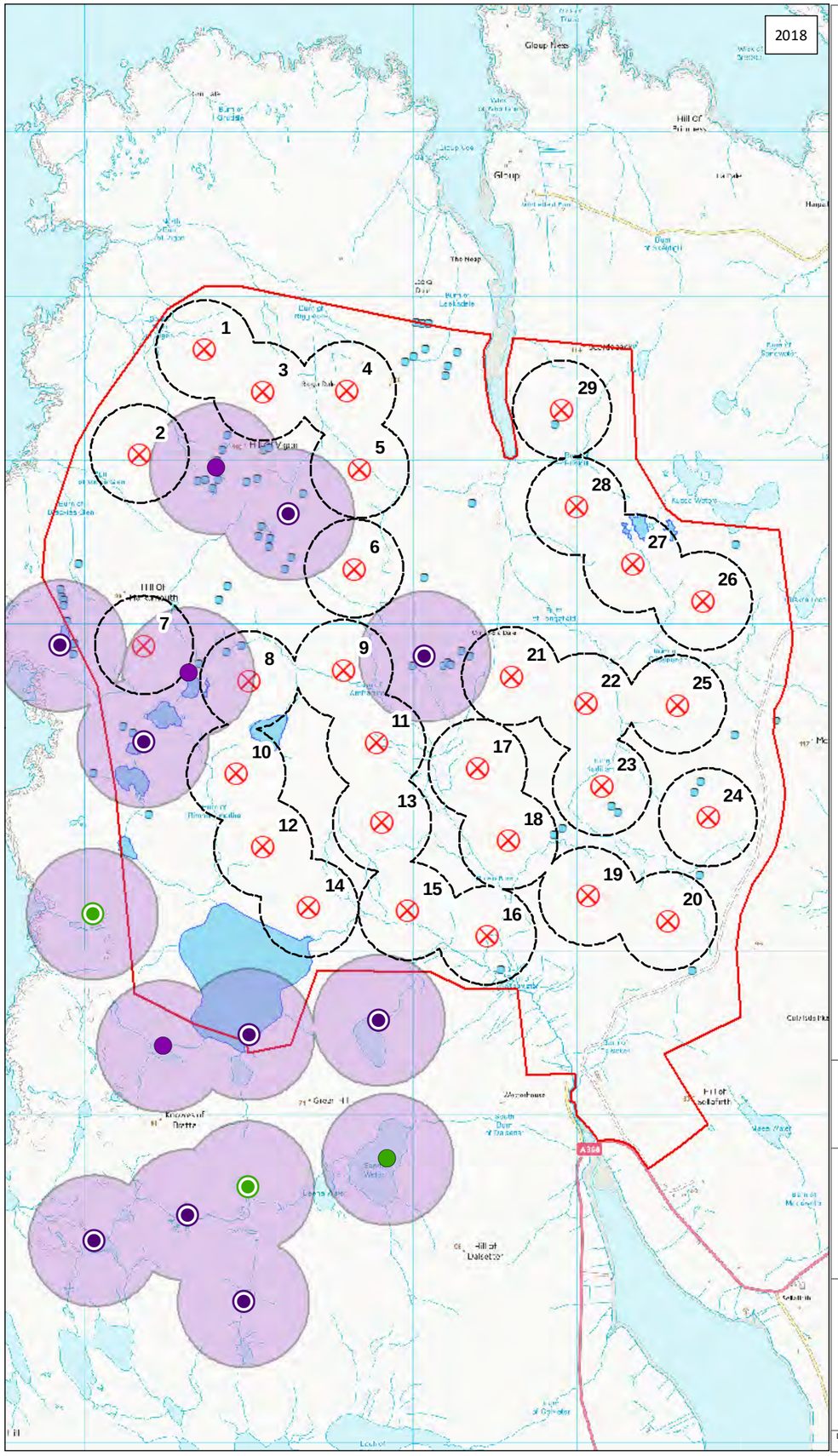
Figure 19
Whimbrel territories
(CONFIDENTIAL)

Date:	Drawn by:	Checked by:	Version:
28/03/2019	COH	GL	V1

Project Number: 11075





KEY

- Site Boundary
- Turbine
- 300 m radius from turbines

Infrastructure

- Met mast
- Site
- Access track and
- Borrow

Red-throated diver nest sites

- Unconfirmed (2016)
- Unconfirmed (2016 and 2018)
- Unconfirmed (2018)
- Confirmed (2016)
- Confirmed (2016 and 2018)
- Confirmed (2018)
- 400 m radius from red-throated diver nest site
- Lochans

0 0.5 1 km

Scale @ A3

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Figure 20
Lochan distribution compared with red-throated diver nest locations

Date:	Drawn by:	Checked by:	Version:
18/04/2019	COH	SB	V3

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Project Number: 11075