



Luggie's Knowe Wind Energy

Scoping Report

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| Client: | Shetland Aerogenerators Ltd |
| Project No: | 3515 |
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Abbreviations

| Abbreviation | Description |
|---------------------|---|
| ATC | Air Traffic Control |
| BAP | Biodiversity Action Plan |
| BGS | British Geological Survey |
| BNG | British National Grid |
| CAA | Civil Aviation Authority |
| CAR | Controlled Activity Regulations |
| CCA | Coastal Character Assessment |
| CEMP | Construction Environmental Management Plan |
| CIEEM | Chartered Institute of Ecology and Environmental Management |
| CifA | Chartered Institute for Archaeologists |
| CRTN | Calculation of Road Traffic Noise |
| DECC | Department of Energy and Climate Change |
| EC | European Commission |
| ECoW | Ecological Clerk of Works |
| EIA | Environmental Impact Assessment |
| ES | Environmental Statement |
| ETSU | Energy Technical Support Unit |
| GCR | Geological Conservation Review |
| GDL | Gardens and Designated Landscapes |
| GLVIA | Guidelines for Landscape and Visual Impact Assessment |
| GPG | Good Practice Guide |
| GWDTE | Groundwater Dependent Terrestrial Ecosystems |
| ha | Hectares |
| HEPS | Historic Environment Policy for Scotland |
| HES | Historic Environment Scotland |
| IBA | Important Bird Areas |
| ICOMOS | International Council on Monuments and Sites |
| IEF | Valued Ecological Features |
| IEMA | Institute of Environmental Management and Assessment |
| IoA | Institute of Acoustics |
| LCS | Local Conversation Sites |
| LCT | Landscape Character Type |
| LDP | Local Development Plan |
| LLAs | Local Landscape Areas |
| LSVIA | Landscape, Seascape and Visual Impact Assessment |
| LVIA | Landscape and Visual Impact Assessment |
| MoD | Ministry of Defence |
| MW | Megawatt |
| NATS | National Air Traffic Services |
| NBN | National Biodiversity Network |
| NCA | Nature Conservation Act |
| NCAP | National Collection of Aerial Photography |
| NCR | National Cycle Routes |
| NNR | National Nature Reserves |



| | |
|------|---|
| NPF | National Planning Framework |
| NRHE | National Record of Historic Environment |
| NSA | National Scenic Area |
| NTS | Non-Technical Summary |
| NVC | National Vegetation Classification |
| OS | Ordnance Survey |
| PAN | Planning Advice Notice |
| PMP | Peat Management Plan |
| PSRA | Peat Stability Risk Assessment |
| PWS | Private Water Supplies |
| RSPB | Royal Society for the Protection of Birds |
| SBL | Scottish Biodiversity List |
| SEPA | Scottish Environment Protection Agency |
| SIC | Shetland Islands Council |
| SMR | Sites and Monuments Record |
| SNH | Scottish Natural Heritage |
| SPA | Special Protection Area |
| SPAD | Scottish Palaeoecological Database |
| SPP | Scottish Planning Policy |
| SSSI | Site of Special Scientific Interest |
| VP | Vantage Point |
| WANE | Wildlife and Natural Environment |
| WCA | Wildlife and Countryside Act |
| ZTV | Zone of Theoretical Visibility |



1. Introduction

1.1 Background & Context

- 1.1.1 Shetland Aerogenerators Ltd ('the Applicant') are preparing an application for the proposed installation and operation of two wind turbines at Luggie's Knowe, Gremista, Shetland (hereafter referred to as the 'Proposed Development').
- 1.1.2 The Applicant submitted an Environmental Impact Assessment (EIA) Screening Request to Shetland Islands Council (SIC) in October 2020 and received a response from SIC in November 2020 advising that the Proposed Development will require to be subject to a formal Environmental Impact Assessment
- 1.1.3 The Applicant, therefore, intends to submit an application for the Proposed Development to SIC under the Town and Country Planning Act (Scotland) 1997. This application will be supported by an EIA governed by the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 as amended (hereafter referred to as 'the EIA Regulations'). This document forms the Scoping Report submitted to SIC in order to request a Scoping Opinion on the content of the EIA of the Proposed Development.
- 1.1.4 Consent was granted in 2012 (planning reference 2011/224/PPF) for the construction and operation of three wind turbines at Luggie's Knowe, each up to 121 m height to blade tip. One of these turbines was constructed and has been operational since 2015. However, the remaining two consented turbines and associated infrastructure have not been constructed, and due to works at the neighbouring Dales Voe Decommissioning Base, the westernmost turbine location is no longer advisable for engineering reasons. This has necessitated consideration of a revised location for that turbine and an adjusted site layout. The Proposed Development therefore includes revised locations for the unbuilt consented turbines.
- 1.1.5 The Proposed Development will consist of two wind turbines each up to 149.9 m height to blade tip, with a total generating capacity anticipated to be 10 megawatts (MW). It is proposed to utilise the existing junction, access track and infrastructure of the operational turbine, with a new access track extending from there to the new proposed turbine locations.
- 1.1.6 The Proposed Development is located approximately 1.2 km north of Gremista, Lerwick on the Hill of Gremista (refer to Figure 1.1), at site centre British National Grid (BNG) 446191, 1145162.

1.2 The Applicant

- 1.2.1 Shetland Aerogenerators Ltd is an independent renewable energy company formed in 1992 and based in Lerwick, Shetland. They own and operate Burradale Wind Farm, which has been operational since 2000 and is one of the most productive wind farms in the world per unit of installed capacity. This high productivity is due to Shetland's unique wind resource. The company built, owns and operates the existing wind turbine at Luggie's Knowe explained in 1.1.4.
- 1.2.2 Since their formation, Shetland Aerogenerators have supported the local economy and community.

1.3 The Purpose of the Scoping Report

- 1.3.1 Regulation 17 of the EIA Regulations provides for potential applicants to ask the planning authority to state in writing the information that ought to be provided within the EIA Report. The 'Scoping Opinion' is to be offered following discussion with the consultation bodies. The Applicant recognises the value of the Scoping approach and the purpose of this report is to ensure that relevant issues are identified and to confirm that the assessment process described will meet legislative requirements.



- 1.3.2 This EIA Scoping Report:
- describes the existing site and its context;
 - identifies key organisations to be consulted in the EIA process;
 - establishes the format of the EIA Report;
 - provides baseline information; and
 - describes key issues and the proposed assessment methodologies for various technical assessments to be covered in the EIA.
- 1.3.3 In addition, each technical chapter concludes by listing the key questions we would like the Scoping Opinion to answer.
- 1.3.4 This Scoping Report will be issued to SIC who will consult with other statutory consultees and interested relevant parties.

1.4 Environmental Impact Assessment

- 1.4.1 The EIA Regulations require that before consent is granted for certain types of development, an EIA must be undertaken. The EIA Regulations set out the types of development which must always be subject to an EIA (Schedule 1 development) and other developments which may require EIA if there is the potential for significant environmental effects as a result of the development (Schedule 2 development). The Proposed Development falls within Schedule 2 of the EIA Regulations.
- 1.4.2 Following submission of an EIA Screening Request as per Schedule 3 of the EIA Regulations, SIC advised in November 2020 that the Proposed Development would require to be subject to a formal Environmental Impact Assessment. The Applicant is, therefore, proceeding to submit an EIA Report.
- 1.4.3 EIA is an iterative process, which identifies the potential environmental effects that in turn, inform the eventual design of the proposals. It seeks to avoid, reduce, offset and minimise any adverse environmental effects through mitigation. It considers the effects arising during the construction, operation and decommissioning phases. Consultation is an important part of the EIA process and assists in the identification of potential effects and mitigation measures.
- 1.4.4 The structure of the EIA Report will follow the requirements of the EIA Regulations and other relevant good practice guidance. Essentially, the EIA Report will comprise three main parts:
- Volume 1 - Written Statement
 - Volume 2 – Figures and Visualisations
 - Volume 3 – Technical Appendices
- 1.4.5 A Non-Technical Summary (NTS) will also be provided.
- 1.4.6 Chapters 1 to 4 of Volume 1 will comprise:
- an introduction;
 - information on the approach to EIA and determination of significance of effects;
 - a description of the site selection and design iteration process; and
 - a description of the Proposed Development.
- 1.4.7 The remainder of Volume 1 will present an assessment of a range of environmental topics. Based on the available baseline environmental information and the details of the Proposed Development, the environmental topics have been scoped on the basis of the potential for significant environmental effects. The following topics will be considered:
- Chapter 5: Landscape and Visual;



- Chapter 6: Ecology;
 - Chapter 7: Ornithology;
 - Chapter 8: Archaeology and Cultural Heritage;
 - Chapter 9: Noise;
 - Chapter 10: Access, Traffic and Transport;
 - Chapter 11: Hydrology, Hydrogeology, Geology and Peat; and
 - Chapter 12: Telecommunications, Aviation and Radar.
- 1.4.8 The EIA Report will also include a schedule of mitigation measures and a summary of residual effects.
- 1.4.9 Each technical chapter will also include a comparative summary of the change in impacts from the consented 2011 Environmental Statement (ES) against the Proposed Development.
- 1.4.10 A standalone Planning Statement assessing the Proposed Development against all relevant planning and energy policy will also accompany the planning application.

2. Proposed Development

2.1 Introduction

- 2.1.1 This section describes the Proposed Development and provides information on its location, physical characteristics, proposed components and design. The turbine and infrastructure layout will be subject to an iterative design process as part of the EIA.

2.2 Site Description

- 2.2.1 The Proposed Development boundary covers an area of around 57 hectares (ha) and is located on land approximately 1.2 km north of Gremista, Lerwick on the Hill of Gremista (Figure 1.1).
- 2.2.2 The existing land use of the Proposed Development site includes the operational turbine and access track. Otherwise, the primary land use is occasional rough grazing by sheep. There is industrial infrastructure in the surrounding vicinity, including the port facility at Dales Voe to the west, and the waste recycling facility to the east.
- 2.2.3 The nearest residential properties are located at South Califf, on the opposite side of Dales Voe to the west.

2.3 Site Design

- 2.3.1 The Proposed Development will be optimised through the EIA process considering environmental, and technical constraints and opportunities.
- 2.3.2 The dimensions of the proposed turbines will be determined as the project design progresses. At this stage, it is anticipated that the turbines will have a height of up to 149.9 m to blade tip. It is proposed to utilise the existing junction, access track and infrastructure of the operational turbine, with new access track extending from there to the new proposed turbine locations.
- 2.3.3 The blades will be made from fibreglass-reinforced epoxy, and the tower will be constructed from rolled steel plate. The finish and colour of the turbines are likely to be semi-matt and pale grey.

2.4 Proposed Development Description

- 2.4.1 The Proposed Development is still at an early stage in its design with a detailed turbine layout, based on the environmental constraints relating to the site, yet to be undertaken.



2.4.2 An initial layout for the Proposed Development suggests that it could consist of two stand-alone, three-bladed horizontal axis, wind turbines with a maximum tip height of 149.9 m, as shown in Figure 2.1. Proposed turbine locations, alongside the operational turbine location, are noted in Table 2.1 below:

Table 2.1 - Turbine Co-ordinates

| ID | Easting | Northing |
|---------------------------------|---------|----------|
| <i>Operational Turbine (T1)</i> | 446337 | 1145644 |
| T2 | 446302 | 1145159 |
| T3 | 446018 | 1144609 |

2.4.3 Figure 2.2 provides a comparison of the previously consented locations against the revised locations for the Proposed Development. The southern turbine of the Proposed Development is approximately 700 m further south than previously consented.

2.4.4 In addition to the wind turbines, associated works will be required for the following:

- turbine foundations;
- crane hardstandings;
- on-site access tracks between turbines and from the operational turbine to the proposed turbines; and
- underground cabling between the turbines.

2.4.5 It is proposed to use the existing laydown area at the operational turbine during construction. Therefore no new compound is anticipated to be required. It is also anticipated that aggregate will be sourced off-site and therefore no borrow pits will be included within the Proposed Development.

2.4.6 The parameters of the EIA will be such that an appropriate level of assessment is undertaken for a given hub height and rotor diameter, within the envelope of a maximum tip height. The turbine locations will evolve in response to the ongoing detailed assessment work, taking consideration of the environmental effects, terrain, current land use, technical and health and safety issues. The parameters of the Proposed Development will be explicitly identified in the EIA Report. The final locations of the turbines will be 'frozen' at an appropriate time in order to enable the EIA Report to describe fully the Proposed Development for which planning consent is sought.

2.5 Cumulative Developments

2.5.1 Schedule 4, Regulation 5 (e) of the EIA Regulations states that cumulative effects should be considered as a part of the EIA. It will therefore be important to consider the cumulative effects of the Proposed Development in combination with other developments in the local area, including those that are currently operational, consented and in planning. The cumulative assessment will also consider the cumulative effects of different elements of the Proposed Development on environmental media and sensitive receptors, and in particular, the cumulative effects upon individual and groups of receptors.

2.5.2 For those cumulative developments which have been consented and which have within their respective cumulative assessments considered the previously consented 2012 scheme, the Applicant proposes that within the EIA, the cumulative assessment will include consideration of the change in impact from this consented, cumulative baseline.

2.5.3 Cumulative wind farm developments within 60km of the site are illustrated in Figure 4.3 and listed in Table 2.2.



Table 2.2 - Cumulative Wind Farm Developments

| Site Name | Status | Number of Turbines | Height to Blade Tip | Distance and Direction from the Site |
|--------------------------------|-----------------------|--------------------|---------------------|--------------------------------------|
| Gremista (operational turbine) | Built | 1 | 121 m | adjacent |
| Mossy Hill | Consented | 12 | 145 m | 1.4 km south-west |
| Hoo Field | Part Built, Consented | 2 | 77 m | 1.7 km south |
| Burradale | Built | 5 | 70 m | 3.8 km south-west |
| Culter Field | Consented | 3 | 67 m | 15 km south |
| Viking | Consented | 103 | 155 m | 10 km north-west |
| Beaw Field | Consented | 17 | 145 m | 36 km north |
| Garth | Built | 5 | 70 m | 54 km north |
| Energy Isles | In Planning | 23 | 200 / 180 m | 54 km north |

- 2.5.4 It should be noted that this record will be updated throughout the EIA process, up to an agreed point prior to submission of the application. We welcome any further information from stakeholders on additional proposed wind farm developments that should be considered.
- 2.5.5 The cumulative assessment would not include the two unbuilt, previously consented turbine locations as these will be replaced by the Proposed Development, and therefore would not be experienced cumulatively.

3. Planning & Policy Context

3.1 Introduction

- 3.1.1 This section provides a high-level overview of the planning policy and supplementary guidance context for the Proposed Development. A more detailed discussion and evaluation of the relevant policies will be included within the Planning Statement that will be provided as a separate supporting document outwith the EIA Report. An up-to-date list of relevant planning policies will be contained within the EIA Report.

3.2 Legislation

- 3.2.1 An Application for the Proposed Development will be made to SIC for planning permission under the Town and Country Planning Act (Scotland) 1997 (as amended).
- 3.2.2 The environmental effects of the Proposed Development will be assessed and evaluated, and the results presented in an EIA Report in accordance with the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 as amended. The findings will be used to assess the compliance of the Proposed Development against the relevant National and Development Plan policies and guidance which will be set out in the Planning Statement.

3.3 National Planning Policy

- 3.3.1 Reference will be made to various national planning policy and guidance documents including but not exhaustive:



- The National Planning Framework 3 (NPF3) and the emerging NPF4;
- Scottish Planning Policy (SPP), taking account of NPF4;
- Scottish Government Online Renewables Planning Advice;
- The Scottish Climate Change Plan; and,
- Scottish Government policy and good practice guidance.

3.4 Local Planning Policy

3.4.1 The planning policy context applicable to the Proposed Development will be taken into account in the iterative EIA design process. The relevant planning policy framework will also be described in the EIA Report.

3.4.2 The site lies entirely within the jurisdiction of Shetland Islands Council. The Proposed Development will be considered against the relevant policies contained in the Shetland Local Development Plan (adopted 2014), adopted supplementary guidance and other relevant supporting documents.

3.4.3 The following policies and guidance are deemed particularly relevant to the Proposed Development:

- Policy RE1 - Renewable Energy;
- Policy GP1 - Sustainable Development;
- Policy GP2 – General Requirements for All Development;
- Policy GP3 – All Development: Layout & Design;
- Policy NH1 – International & National Designations;
- Policy NH2 – Protected Species;
- Policy NH3 – Furthering the Conservation of Biodiversity;
- Policy NH4 – Local Designations;
- Policy NH5 – Soils;
- Policy HE1 – Historic Environment;
- Policy HE4 – Archaeology;
- Supplementary Guidance – Onshore Wind Energy (2018);
- Draft Supplementary Guidance – Local Landscape Areas (2014);
- Draft Supplementary Guidance – Natural Heritage (2012); and,
- Landscape Sensitivity and Capacity Study for Wind Farm Development on the Shetland Islands (2009).

3.4.4 Further policies relevant to each technical assessment have been outlined in Sections 4 to 12 below.

3.5 Scoping Questions to Consultees

3.5.1 Are the planning policies identified appropriate for inclusion in the EIA and Planning Statement?

3.5.2 Are there any other planning policies not listed in this Scoping Report that should be considered in the EIA?

3.5.3 Are there any local material considerations of relevance to the Proposed Development which should be considered?

3.5.4 Is the list of cumulative schemes and exclusion of the existing consented turbine locations appropriate?



4. Landscape and Visual Impact

4.1 Introduction

4.1.1 This section presents the proposed scope of work for the Landscape and Visual Impact Assessment (LVIA). The purpose of the LVIA process is to identify the potential effects of the Proposed Development on:

- landscape character and resources, including effects on the aesthetic values of the landscape, caused by changes in the elements, characteristics, character and qualities of the landscape; and
- visual amenity, including effects upon potential viewers and viewing groups caused by a change in the appearance of the landscape as a result of the Proposed Development.

4.1.2 Landscape character and resources are considered to be of importance in their own right and are valued for their intrinsic qualities regardless of whether they are seen by people. Impacts on visual amenity as perceived by people are clearly distinguished from, although closely linked to, impacts on landscape character and resources. Landscape and visual assessments are therefore separate, although linked, processes.

4.2 Baseline Description

Baseline Conditions of the Site

4.2.1 The Proposed Development is located approximately 1.2 km north of Gremista, Lerwick, on the Hill of Gremista, on the south side of Dales Voe. The site falls within the Major Uplands Landscape Character Type (LCT) and lies adjacent to the Farmed and Settled Voes and Sounds LCT to the north as identified within the NatureScot (formerly Scottish Natural Heritage (SNH)) online Scottish Landscape Types Map and Descriptions (SNH, 2019). Dales Voe forms part of the Eswick – Bressay Coastal Character Area.

4.2.2 The existing land use of the site includes the single operational turbine and access track; otherwise, the land use is primarily occasional rough grazing by sheep. Landcover is predominantly heather moorland with areas of grassland. At the eastern extent of Dales Voe, the landscape is a developed landscape with a port and industrial infrastructure. The Gremista Landfill and Recycling Centre lies to the east within a quarry, alongside the existing wind turbine at Luggie's Knowe. The Loch of Kebister lies beyond the site boundary to the southwest.

4.2.3 The landscape consists of large-scale upland ridges, with a north-east to south-west orientation. Areas of coastal crofting and farming land framing the intervening, sheltered, Dales Voe. Views within this landscape are directed along the incised voe to the uplands which frame the backdrop. This landscape will also be observed from approaching ships and ferries.

4.2.4 A number of small settlements, isolated residential properties and other visual receptors are located within 2 km of the site, and the northern edges of Lerwick are within 3 km of the site. As with all wind farm developments, there is potential for some localised significant effects. The nearest residential properties are scattered along the northern edge of the voe with clusters of settlement at South Califf, North Califf and Breiwick.

4.2.5 The site does not contain any notable landscape features, such as landmark hills, which constitute rare or notable 'scenic' elements and there are no residential properties within the site boundary.

4.2.6 The site is not covered by any form of landscape designation at either a national or local level.



The Wider Study Area

General

- 4.2.7 The study area comprises a range of landscape character types, designations and visual receptors. It encompasses the eastern sector of the Mainland to the north of Lerwick, which is characterised by a series of north east to south west aligned parallel voes which indent the coastline including sequentially to the north, Dales Voe, Lax Firth, Wadbister Voe and Cat Firth. The peninsula at South Nesting frames the inner northern edge of the core study area. To the south and west, the parallel whale backed ridgelines of the central mainland breaks up visibility to the west. The site extends across the Hill of Gremista which frames the northern edge of Bressay Sound and areas of visibility extend across the edges of Lerwick, along Bressay Sound, and across western Bressay. The inner study area extends to the south, encompassing the regular sequence of bays of the Quarff Coast on the eastern coastal edge of Mainland, south of Lerwick through to Helli Ness, a busy shipping area and sporadically settled coastline.

Landscape Character

- 4.2.8 The landscape character of the study area covers a wide variety of landscape types from Major Uplands, Peatlands and Moorlands, Inland Valleys, to Farmed and Settled Lowlands and Coast, and Voes and Sounds. The assessment will consider the effects of the Proposed Development on the landscape character types that cover the study area, as described in NatureScot's digital map-based national Landscape Character Assessment (SNH, 2019).
- 4.2.9 The assessment will also consider Coastal Character as set out in the Shetland Coastal Character Assessment (CCA), (Slater, C. and Shucksmith, R., 2017), and Seascape Character as set out in 'An assessment of the sensitivity and capacity of the Scottish seascape in relation to offshore wind farms', NatureScot Commissioned Report No.103 (SNH, 2005).

Landscape Designations

- 4.2.10 There are a number of designated areas within the study area, as described below, and these will be considered in the assessment.
- 4.2.11 Within 40 km of the Proposed Development site, there is one National Scenic Area (NSA), the Shetland NSA, which covers a number of different locations within the Shetland Islands. The following sub-units of the Shetland National Scenic are located within the study area: South West Mainland; Muckle Roe; and Eshaness (refer to Figure 4.1). The assessment will confirm the extent of visibility of the final turbine layout on the NSA and establish the nature of the effects on its special qualities, in accordance with the current NatureScot methodology.
- 4.2.12 There are two Inventory Gardens and Designed Landscapes (GDL) within 40 km of the Proposed Development site, at Gardie House and Lunna House. The closest, Gardie House, is 3.7 km to the south east of the Proposed Development site (refer to Figure 4.1). The assessment will carefully review any effects upon the criteria for designation of the GDL.
- 4.2.13 Areas of the Mainland and the surrounding islands are defined as Local Landscape Areas (LLAs) in the SIC Supplementary Guidance, Local Landscape Areas, Consultation Draft (SIC, 2014). The purpose of the LLAs is to, *"ensure sympathetic siting and design of new development within the LLAs"*. Sites within LLAs are not precluded from development, but development in LLAs should not *"adversely affect the integrity of the area or the qualities for which it has been designated, or any such effects are clearly outweighed by social, environmental or economic benefits"*. Local Landscape Areas in the wider study area include Gletness and Skellister; Aithness and Noss; Weisdale; Culswick and Westerwick; and Walls and Vaila. The closest of these are the Gletness and Skellister LLA and the Aithness and Noss LLA which are both likely to experience visibility of the Proposed Development. The effects of the Proposed Development on the key characteristics, special qualities and sensitivity to change of the LLAs will be considered in the assessment.



Zone of Theoretical Visibility

4.2.14 The indicative Zone of Theoretical Visibility (ZTV) that has been prepared (shown on Figures 4.1 and 4.2) illustrates the likely extent of theoretical visibility within the area surrounding the Proposed Development and this will also be used to assist in selecting the final viewpoint locations.

Visual Receptors and Visual Amenity

4.2.15 A number of potential visual receptors are identifiable within the 40 km study area. The LVIA will include consideration of the receptors listed below. It should be noted that these are not intended to be a comprehensive list of receptors, but are rather examples of locations that may be included.

4.2.16 **Settlements:** Within the immediate vicinity of the site, the principal groups of residential receptors are located along the northern edge of Dales Voe with clusters of settlement at South Califf, North Califf and Breiwick. Other visual receptors are located at the northern edges of Lerwick are within 3 km of the site, and receptors on the west coast of Bressay are within 5 km of the site. More distant visibility will be experienced from South Nesting 7.5 km to the north.

4.2.17 The preliminary ZTV (Figures 4.1 and 4.2) indicates visibility will be fragmented and generally restricted within most of the settlements. The settlements that lie in closest proximity to the site within Dales Voe, at Lerwick and Bressay will be considered in greater detail in the assessment. Detailed desk study and fieldwork will provide an assessment of effects on settlements.

4.2.18 **Roads:** The A970 will experience sections of visibility in and around Lerwick, and at Whiteness, with further areas of fragmented visibility to the south of Lerwick. Short sections of the A971 will experience visibility as the route passes over the ridgeline of Mainland.

4.2.19 **National Cycle Routes (NCR):** NCR 1 runs from Sumburgh Head in the south of the study area, passing through Lerwick on the route of the A970 before continuing north on the A970, via the ferry at Toft to Yell.

4.2.20 **Ferries:** The main ferry connection to the Scottish mainland passes through Bressay Sound to the harbour in Lerwick, with local ferry routes crossing from Lerwick to Bressay and to the Out Skerries. From these routes, there will be a range of sequential views to the Proposed Development.

4.2.21 **Visitor destinations:** Local destinations include Lerwick and Bressay, with Fort Charlotte providing an elevated viewpoint across the capital, which is seen against a backdrop of hills which will include the Proposed Development. There are numerous local archaeological sites across the inner study area. The key attraction of Mousa Broch lies to the south. Informal attractions for visitors and recreational walkers include the extensive coastlines, geoparks, and nature reserves.

4.2.22 Detailed lists of receptors will be identified through the scoping consultation and assessment process. A preliminary list of representative viewpoints is proposed in the below Table 4.1.

Table 4-1 Preliminary List of Viewpoints

| VP | Location of Viewpoint | Receptor | Approximate Distance and Direction to Receptor | Grid Reference |
|----|------------------------------------|------------|--|-----------------|
| 1. | North Califf, Dales Voe | Residents | 1.59 km NW | 444833, 1146177 |
| 2. | Gremista Brae, Holmsgarth, Lerwick | Residents | 2.22 km S | 446424, 1142425 |
| 3. | North Ness Business Park, Lerwick | Visitors | 3 km S | 447512, 1141953 |
| 4. | Gilbertson Park, Lerwick | Visitors | 3.3 km S | 447115, 1141412 |
| 5. | Fort Charlotte, Lerwick | Visitors | 3.4 km S | 447559, 1141472 |
| 6. | Bressay Ferry | Travellers | 3.6 km SE | 448208, 1141673 |



| VP | Location of Viewpoint | Receptor | Approximate Distance and Direction to Receptor | Grid Reference |
|-----|--|--------------------------|--|-----------------|
| 7. | Gardie House, Bressay | Visitors | 3.7 km SE | 448759, 1142042 |
| 8. | The Knab, Lerwick | Visitors | 4.5 km S | 447965, 1140510 |
| 9. | Beosetter, Bressay | Residents | 3.1 km E | 449250, 1144134 |
| 10. | Girlsta / A970 | Residents/ Road Users | 5.7 km N | 442646, 1150463 |
| 11. | Nesbister Hill | Walkers | 5.8 km W | 440240, 1145405 |
| 12. | Loch of Tingwall | Visitors | 4.5 km W | 441679, 1143443 |
| 13. | Gletness | Residents | 5.7 km N | 446905, 1151308 |
| 14. | Kirkabister Ness, Bressay | Visitors | 7.5 km SE | 448913, 1137652 |
| 15. | Freester near Loch Benson, South Nesting | Residents | 7.6 km N | 445280, 1153190 |
| 16. | Helli Ness | Walkers | 15.8 km S | 446102, 1128736 |

4.2.23 Visualisations will be prepared in accordance with the standards contained in the Visual Representation of Windfarms: Version 2.2 (SNH, 2017).

4.3 Cumulative Baseline

4.3.1 The cumulative assessment will extend to mapping all built and consented wind farms and sites in planning within a 60 km radius, in accordance with NatureScot's guidance on cumulative impact assessment (SNH, 2012). For the Proposed Development, the primary cumulative impact considerations are expected to relate to the cluster of proposed and consented wind farm developments at Burradale, Mossy Hill, Gremista and Hoo Field which may result in significant change in the landscape of this area.

4.3.2 The cumulative assessment will focus on the consented and built wind farm sites and sites which have submitted planning applications within 40 km, to assess whether any significant cumulative effects are likely to occur. This follows guidance given by NatureScot in their documents Visual Representation of Windfarms: Version 2.2, (SNH, 2017) and Assessing the Cumulative Impact of Onshore Wind Energy Developments, (SNH, 2012). A draft list of cumulative sites is presented in Table 2.2 above, and the locations of these sites relative to the Proposed Development are shown in Figure 4.3.

4.4 Guidance and Legislation

4.4.1 The approach and method for the assessments will be informed by the guidance provided in the following documents:

- Guidelines for the Assessment of Landscape and Visual Impacts, 3rd Edition. The Landscape Institute with the Institute of Environmental Management and Assessment, 2013;
- Landscape Character Assessment: Guidance for England and Scotland, Countryside Agency and SNH, 2002;
- Topic Paper 6. Techniques and Criteria for Judging Capacity and Sensitivity, Countryside Agency and SNH, 2004;
- Assessing the Impacts on Wild Land: Interim Guidance Note, SNH, 2007;
- Assessing the Cumulative Impact of Onshore Wind Energy Developments, SNH, 2012;



- SPP, 2014;
- Visual Representation of Windfarms: Guidance, Version 2.2, SNH, 2017;
- Working Draft 11 – Guidance for Assessing the Effects on Special Landscape Qualities of National Scenic Areas, SNH, November 2018;
- The Landscape Institute Technical Guidance Note: Residential Visual Amenity Assessment, 2/19; and
- The Landscape Institute Technical Guidance Note: Visual Representation of Development Proposals, 9/19.

4.5 Proposed Scope of Assessment

General

- 4.5.1 The LVIA will assess the potential effects of the wind farm (including access tracks and other associated infrastructure as well as the turbines) on landscape character and visual receptors around the study area.

Approach to Baseline

Study Areas

- 4.5.2 The study area for the assessment of landscape and visual effects of the Proposed Development will cover a radius of 40 km from the nearest turbine. This distance has been informed by consideration of the preliminary ZTV to identify those areas within which significant visual impacts of the proposed wind farm are likely to occur and follows guidance given by NatureScot in their document Visual Representation of Windfarms: Version 2.2, (SNH, 2017). The proposed study area is to be agreed with SIC and NatureScot and is illustrated in Figures 4.1 and 4.2.
- 4.5.3 The cumulative assessment will initially cover a larger study area, to be agreed with SIC and NatureScot. This is likely to extend to map all built and consented wind farms and sites in planning within a 60 km radius in the first instance and then focussing the cumulative assessment on the wind farm sites within 40 km. This follows guidance given by NatureScot in their documents Visual Representation of Windfarms: Version 2.2, (SNH, 2017) and Assessing the Cumulative Impact of Onshore Wind Energy Developments, (SNH, 2012).

Desk Study

- 4.5.4 As part of the desk study, existing map and written data regarding the Proposed Development site and its environs will be reviewed, including:
- the 2011 ES for the consented wind farm.
 - SPP, 2014;
 - Renewable Energy and the Natural Heritage, SNH Policy Document, 2014;
 - Spatial Planning for Onshore Wind Turbines – natural heritage considerations, SNH, June 2015;
 - Wildness in Scotland’s Countryside, SNH, Policy Statement 02/03;
 - SIC, Local Development Plan (LDP) 2014;
 - SIC, Landscape Sensitivity and Capacity Study for Wind Farm Developments, (LUC, 2009);
 - SIC, Supplementary Guidance, Local Landscape Areas, Consultation Draft 2014;
 - Inventory of Historic Gardens and Designed Landscapes in Scotland, Historic Scotland; and
 - Ordnance Survey Maps.



- 4.5.5 The desk study will assist in the definition of the baseline landscape and visual resource within the study area and the main users of the area, key viewpoints and key features.
- 4.5.6 The aim of the baseline visual assessment is to ensure that a representative range of viewpoints are included in the visual assessment in order to represent the identified receptors. The potential extent of visibility of the Proposed Development is identified by reference to Ordnance Survey map data, the draft ZTV mapping, and observations made in the field. Following this step, potential visual receptors likely to be affected by the Proposed Development are identified.
- 4.5.7 Viewpoints are selected to ensure that the visual assessment includes a representative range in relation to the following criteria:
- Type of receptor - including different landscape character areas if appropriate;
 - Distance of receptor from Proposed Development - to a maximum distance of a 40 km radius oval offset from the outermost turbines of the Proposed Development, as shown in Figure 4.2; and
 - Direction of receptor from Proposed Development, with the aim of achieving an even distribution from different compass points around the site.
- 4.5.8 The desk study will provide the basis for subsequent field survey work. It will inform the description of the Landscape Character Areas for the study area, the definition of the potential extent of visibility and the identification of the principal viewpoints and receptors, which will be subsequently confirmed during the field survey.

Field Survey

- 4.5.9 The baseline landscape assessment will include field survey work, carried out to verify the landscape character areas identified within the study area and gain a full appreciation of the relationship between the Proposed Development and the landscape.
- 4.5.10 Field survey work will also verify the appropriateness of the proposed viewpoints. This will involve checking the initial viewpoint selection on the ground, to ensure that there will be views of the Proposed Development from these locations. In some instances, this can be remedied by slight adjustments of the location, although this has to remain relevant to the particular receptor(s) for which the viewpoint is selected. It will also be important to ensure that the selected viewpoints are a representative view and demonstrate potential visibility of the Proposed Development for the selected location. The fieldwork will be supported by analysis of Ordnance Survey maps, and observations will be recorded with photographs.

Assessment of Effects

- 4.5.11 Once the baseline situation in relation to landscape and visual receptors has been reviewed, this information will be combined with an understanding of the proposed change or development that is to be introduced, in order to identify and describe the landscape and visual effects. As the mitigation will be embedded as part of the design, potential effects and residual effects will be the same. The assessment process determines whether the level of an effect would be significant or not through methodical consideration of, firstly, the sensitivity of landscape and visual receptors relative to changes as a result of the Proposed Development and, secondly, the magnitude of change that they would experience.

Determining Significance

- 4.5.12 The level of any identified landscape or visual effect will be assessed as major, moderate, minor or no effect, or intermediate categories (e.g. major/moderate) between these. These categories will be determined by consideration of the sensitivity of landscape or visual receptor and the predicted magnitude of change that would be experienced as a result of the Proposed Development. The following matrix in Table 4.2 will be used as a guide to correlating sensitivity and magnitude to determine the level of predicted effects and their significance.



Table 4-2 Significance of Effects on Landscape and Visual Receptors

| Sensitivity | Magnitude of Change | | | |
|-------------|---------------------|-------------------|-------------------|-------------------|
| | Substantial | Moderate | Slight | Negligible |
| High | Major | Major to Moderate | Moderate | Moderate to Minor |
| Medium | Major to Moderate | Moderate | Moderate to Minor | Minor |
| Low | Moderate | Moderate to Minor | Minor | Minor to None |
| Negligible | Moderate to Minor | Minor | Minor to None | Minor to None |

- 4.5.13 This assessment will be calibrated such that the threshold of significance is major to moderate. Where, for the purpose of this assessment, the landscape or visual effect has been classified as major or major/moderate, this will be considered to be a significant effect in terms of the EIA Regulations. It should be noted that effects are not always adverse and may also be beneficial. However, the assessment will assume that the effects are adverse unless otherwise stated.
- 4.5.14 The table will not be used as a prescriptive tool, and the methodology and analysis of potential effects at any particular location will make allowance for the exercise of professional judgement. Thus, in some instances, a particular parameter may be considered to have a determining effect on the analysis.
- 4.5.15 The assessment will also provide a comparative summary of the change in impacts from the consented 2011 ES against the Proposed Development and indicate whether the assessed effect has changed.

Cumulative Effects

- 4.5.16 The approach that will be used to address cumulative effects will be based on GLVIA 3 and the NatureScot guidance note on cumulative assessment, Assessing the Cumulative Impact of Onshore Wind Energy Developments (SNH, 2012).
- 4.5.17 The Proposed Development will form the focus of the study, and the cumulative LVIA provides a tool to consider ways in which the Proposed Development will have additional impacts when considered together with existing and proposed developments.
- 4.5.18 The assessment will consider:
 - The contribution that the Proposed Development will make to the ‘cumulative baseline’ – i.e. the operational and consented sites; noting that whilst operational sites are clearly already present in the landscape, there is a high degree of certainty around the future presence of consented sites, but it is also the case that some consented sites may not ever be operational.
 - The effects on landscape and visual receptors and the effects resulting from the Proposed Development in combination with sites at application stage, noting that there is a lower degree of certainty that these sites may obtain consent and be operational: some will and others will fall away, such that the associated cumulated effects will not arise.
- 4.5.19 The assessment will include consideration and assessment of both the additional effect of the Proposed Development and the combined (total) changes resulting from a set of developments.



- 4.5.20 The level of any identified cumulative landscape or visual effect will be assessed as major, moderate, minor or none, or intermediate between these bands, in relation to the sensitivity of the receptor and the predicted magnitude of change as outlined above. As in the case of noncumulative effects, the matrix shown in Table 4.2 will be used to bring together receptor sensitivity and magnitude of change, and determine cumulative significance through professional judgement.

Consultation

- 4.5.21 Consultation will be undertaken with both SIC and NatureScot to agree the scope of the landscape and visual assessment, including the study area and the proposed viewpoints.

Receptors and Impacts Scoped Out of Assessment

- 4.5.22 The turbines are proposed at heights lower than 150 m to blade tip and will not, therefore, be subject to Civil Aviation Authority (CAA) regulations requiring visible aviation lighting. In this regard, a Night Time Lighting Assessment will not be required to support the assessment of the landscape and visual effects.

4.6 Potential Mitigation

- 4.6.1 The principal mitigation of landscape and visual effects of wind farms is achieved through careful layout design and turbine height selection, which can reduce effects or, in some cases, prevent effects from arising. The potential for mitigation of landscape and visual effects will be considered throughout the design and assessment process, based upon a combination of landscape and visual factors alongside, ecology, ornithology and peat constraints.

4.7 Potential Impacts

- 4.7.1 Potential impacts will comprise direct effects on the proposed site for the turbines, and on landscape and visual receptors in the surrounding area, resulting from the construction, operational and decommissioning phases of the Proposed Development. These will include:
- Effects of the construction of the wind turbines and ancillary development on the existing character of the site and its surroundings, its landscape features and land cover;
 - Effects of the construction of the wind turbines and ancillary infrastructure on the visual amenity experienced in the wider landscape;
 - Operational effects of the wind turbines and associated infrastructure upon the existing features and land cover of the site and upon landscape character;
 - Operational effects of the wind turbines and associated infrastructure upon the visibility of the Proposed Development in the wider landscape, particularly from visually sensitive locations. These locations may include designated landscapes and tourist destinations; interpreted viewpoints and well-frequented roads such as the A970, and landmark hill summits;
 - Decommissioning effects of the wind turbines and associated infrastructure upon the existing features and landcover of the site and upon landscape character; and
 - Decommissioning effects of the wind turbines and associated infrastructure (including access tracks), on the visual amenity experienced in the wider landscape.
 - The prediction of magnitude and assessment of the significance of the residual landscape and visual effects will be based on pre-defined criteria set out in the methodology.

4.8 Scoping Questions to Consultees

- 4.8.1 In summary, consultee agreement is sought for the following key areas of the landscape and visual impact assessment, as set out in detail above:



- Do consultees agree with the proposed methodology to be used?
- Do consultees agree with the proposed Study Area(s) for the Landscape and Visual Impact Assessment?
- Do consultees agree with the proposed viewpoints?
- Do consultees agree with the proposed scope of the Cumulative Landscape and Visual Impact Assessment?
- Are there any additional matters arising?

5. Ecology

5.1 Introduction

5.1.1 The Ecology chapter of the EIA Report will assess the potential significant effects on non-avian ecology and nature conservation features during the construction, operation and decommissioning phases of the Proposed Development. The EIA Report will include a separate Ornithology chapter (refer to Section 6).

5.1.2 The Ecology chapter of the EIA Report will present the following:

- A summary of consultation responses.
- A description of methods used to define the non-avian ecology baseline conditions and for undertaking the Ecological Impact Assessment (EclA).
- A description of international, national and local sites designated for their species and habitats, such as Special Areas of Conservation (SACs), Special Sites of Scientific Interest (SSSIs), National Nature Reserves (NNRs) and Local Nature Conservation Sites (LNCSs) will be undertaken within 10 km of the Proposed Development, as well as a review of existing records of protected or otherwise notable species.
- A description of the existing ecology baseline for the Proposed Development site ('the site') and wider ecological study area up to 250 m from the boundary of the site ('zone of influence') including habitat types and evidence of any protected and priority species (including European Protected Species, and/or Scottish Biodiversity List (SBL) / Local Biodiversity Action Plan species).
- An evaluation of the ecological baseline with identification of Valued Ecological Features (IEFs) brought forward to EclA.
- An assessment of the potential significant ecological effects of the Proposed Development in isolation as well as potential cumulative effects and difference from previous consent.
- Proposed mitigation to improve identified potential effects (where appropriate) as well as any proposed habitat management or enhancement measures.
- An assessment of the potential residual significant effects following the implementation of mitigation.

5.1.3 The Ecology chapter of the EIA Report will be supported by a number of technical appendices.

5.1.4 This Scoping exercise has been undertaken in accordance with the Guidelines for Baseline Ecological Assessment (Institute of Environmental Assessment, 1995) and the Guidelines for Ecological Impact Assessment in the UK (Chartered Institute of Ecology and Environmental Management (CIEEM), 2018). It aims to provide a brief outline of the existing ecological conditions of the site and local area, give an overview of the legal and planning policy drivers for the assessment, and describe the studies, which will be undertaken to further define the baseline, as well as the impact methodology which will be followed.



5.2 Baseline Description

- 5.2.1 The site was subject to a Phase 1 habitat survey and National Vegetation Classification (NVC) in 2010. The Proposed Development site is open moorland, predominantly consisting of wet heath / acid grassland habitats and surrounded on three sides by industrial land, including open areas of mining and large processing plants and then open sea. Further moorland extends south-west. A number of small lochans and the Loch of Kebister are found south-west of the site boundary.
- 5.2.2 A preliminary desk study of publicly available data has identified a number of national sites designated for non-avian ecological considerations within a 10 km radius from the site. These are described in Table 5.1 and shown on Figure 5.1. Where a designation comprises two or more distinct sections, the distance to the section nearest to the Proposed Development has been identified.

Table 5.1 – Ecological Designations

| Name | Designation | Distance / Direction | Reason for Designation |
|---------------------------|-------------|----------------------|--|
| Loch of Tingwall and Asta | SSSI | 3.8 km SW | Freshwater habitats: Mesotrophic Loch. |
| Loch of Girlsta | SSSI | 6 km N | Arctic charr (<i>Salvelinus aplanus</i>) and freshwater habitats: Mesotrophic Loch. |
| South Whiteness | SSSI | 6 km W | Saltmarsh habitat and Shetland mouse-ear hawkweed (<i>Pilosella flagellris ssp bicapitata</i>) |
| Sandwater | SSSI | 9 km NW | Mesotrophic Loch and Open Water Transition Fen habitats |

- 5.2.3 A number of Local Nature Conservation sites are also found on Shetland, but none occurs within 2 km of the site. The closest to the Proposed Development and designated for biological features is Clickamin Loch, located approximately 3.8 km south.

5.3 Guidance and Legislation

Legislation

- 5.3.1 Relevant legislation and guidance documents have been reviewed and will be taken into account as part of this ecological assessment. Of particular relevance are:
- Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Flora and Fauna (the "Habitats Directive");
 - The Wildlife and Countryside Act 1981 (as amended) (WCA);
 - The Ramsar Convention 1975;
 - The Conservation (Natural Habitats &c.) Regulations 1994 (as amended in Scotland) (the "Habitats Regulations");
 - The Conservation of Habitats and Species Regulations 2010 (as amended);
 - The Wildlife and Natural Environment (Scotland) Act 2011 (as amended) (the "WANE Act"); and
 - Nature Conservation (Scotland) Act 2004 (as amended) (the "NCA").

Planning Policy

- 5.3.2 The stand-alone Planning Statement will provide an overview of all the relevant planning policy for the EIA Report. Of particular relevance to this chapter are:



- National Planning Framework 3 (Scottish Government, 2014);
- SPP (Scottish Government, 2019); and
- Shetland Local Development Plan 2014 (SIC, 2014).

5.3.3 Planning Advice Note (PAN) 60: Planning for Natural Heritage provides guidance relevant to this assessment and the Proposed Development.

Guidance

5.3.4 Further key guidance documents relating to the assessment of the effects of wind farms on terrestrial (non-avian) ecological receptors that have been referenced in this assessment include the following:

- The Scottish Biodiversity List (SBL; Scottish Government, 2013);
- Biodiversity Duty Report for Shetland Islands Council 2015 to 2017 (SIC, 2017);
- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2018);
- Good Practice during Wind Farm Construction 4th Edition (SNH, 2019);
- Planning for development: What to consider and include in Habitat Management Plans (SNH, 2016); and
- Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems (Scottish Environment Protection Agency (SEPA), 2017).

5.4 Proposed Scope of Assessment

Proposed Study Area

5.4.1 The study area for all ecology surveys will include the site and a 250 m survey buffer, as described in Sections 0 to 5.4.4, below.

Assessment Methodology

Extended National Vegetation Classification Survey

5.4.2 The original Phase 1 habitat and NVC data will be ground-truthed and updated where needed. This will be done between May and September for the area covering the potential turbine locations and a 250 m buffer (access permitting) and the access track corridor and a 100 m buffer (access permitting). The NVC survey will follow the standard methodology set out in the NVC Users' Handbook (Rodwell, 2006) and with reference to the standard descriptions and constancy tables (Rodwell 1991 *et seq.*). Phase 1 categories will be derived from the NVC data. Communities will be evaluated in terms of their nature conservation interest and potential groundwater dependence (SEPA, 2017).

Otter Survey

5.4.3 Otter (*Lutra lutra*) is strictly protected as a European Protected Species. It is known to be active along much of the Shetland coastline, and a dedicated survey investigating for signs of their activity will therefore be carried out across the site and a 250 m buffer up/down any watercourses that dissect the site. This survey buffer is due to the larger distance over which potential disturbance impacts can occur, particularly when considering natal den sites. The survey will be based on standard methods, as per Chanin (2003) and the applicable CIEEM (2018) guidelines. The methods involve searching for field evidence, such as feeding signs, spraints (droppings) and places of rest (holts or layups), footprints, runways in vegetation and sightings of the animals themselves.



Receptors and Impacts Scoped Out of Assessment

Freshwater Fish Surveys

- 5.4.4 Given the absence of major watercourses on the site, it is considered that dedicated freshwater fish surveys will not be required.

Seals and Other Marine Mammals

- 5.4.5 Given the c.500 m distance between the potential works areas of the Proposed Development and the nearest section of coastline, significant impacts on seals and other marine mammals are very unlikely. We, therefore, propose to not undertake surveys for seals or other marine mammals.

Bats

- 5.4.6 Bat species are not known to roost on Shetland. A preliminary search of the NBN Gateway within the 10 km grid square (HU44) returned a record of pipistrelle bat from 1979, listed as occurring in Lerwick. However, this record remains unusual as there is no established bat population on the Shetland Islands. In addition, the Proposed Development area is an exposed, coastal site with no trees and no structures with any potential to support bat roosts located within 500 m of the proposed turbine area. Therefore, bat surveys are not deemed necessary and not proposed.

Other Species

- 5.4.7 No surveys are proposed for other protected mammal species, such as badgers (*Meles meles*), water voles (*Arvicola amphibius*), Scottish wildcats (*Felix sylvestris*) and others, as these species are not present on Shetland.
- 5.4.8 Similarly, no surveys are proposed for reptiles or amphibians, which are also not present on Shetland.
- 5.4.9 The previous submission noted records of reflexed saltmarsh grass (*Puccinellia distans*) and *Rhiogognostis senilella*, a nationally notable moth, were identified during the desk study. These records were 2.6 km and 2.2 km distant from the site, respectively. Given the distance from the site and the fact that reflexed saltmarsh grass is a coastal grass species unlikely to be present within the site and the moth larvae feed on rock-cress (*Anachis*) and dame's violet (*Hesperis matronalis*) which is also unlikely to be present on the site, no specific moth survey is proposed.

Ecological Impact Assessment

- 5.4.10 The EclA will follow the CIEEM (2018) guidelines for Ecological Impact Assessment in the UK and Ireland. The Non-avian Ecology chapter of the EIA Report will define the ecology baseline for the Proposed Development site and local area, with survey findings analysed and presented (where appropriate) in a technical report. Ecological baseline features will then be evaluated and Valued Ecological Features (IEFs) identified. Activities during the construction, operational and decommissioning phases and their potential significance on vulnerable IEFs will be identified, and an assessment will be made of direct and indirect impacts with consideration of the above guidelines and the geographical scale at which they are significant. Potential cumulative ecological effects will also be assessed for schemes up to 5 km from the site boundary. The assessment will be undertaken in the presence of standard mitigation. Where significant effects are identified, additional mitigation measures may be proposed to reduce effects.
- 5.4.11 The assessment will also provide a comparative summary of the change in impacts from the consented 2011 ES against the Proposed Development and indicate whether the assessed effect has changed.

5.5 Potential Mitigation

- 5.5.1 During the Proposed Development design and EIA process, mitigation measures will seek to follow the recognised hierarchy of avoidance, reduction, enhancement, and compensation. A range of



standard mitigation measures will be implemented to reduce any adverse ecological effects, including:

- A suitably qualified Ecological Clerk of Works (ECoW) will be appointed prior to the commencement of any construction activities take place. The ECoW will be present and oversee construction activities as well providing toolbox talks to all site personnel with regards to priority species and habitats, as well as undertaking monitoring works and briefings to relevant staff and contractors as appropriate.
- In order to prevent pollution of watercourses within the site (with particulate matter or other pollutants such as fuel), best practice techniques will be employed.
- Full details of construction mitigation measures will be provided in a Construction Environment Management Plan (CEMP) to be agreed with SIC, in consultation with NatureScot and SEPA, post-consent but prior to development commencing.

5.5.2 If there is considered to be potential for incorporating biodiversity enhancement measures into the development, then an integrated mitigation and enhancement package will be proposed. This will address ecological effects and will reflect local objectives in terms of biodiversity and the enhancement of environmental character.

5.6 Potential Impacts

5.6.1 The key ecology and nature conservation issues to be considered with respect to the Proposed Development are likely to include the following:

- disturbance and direct mortality of fauna during construction, operation and decommissioning;
- behavioural changes of fauna during operation;
- pollution via road drainage and runoff during all development phases; and
- habitat loss in terms of the possible presence of blanket bog / wet heath or other protected habitat types.

5.7 Scoping Questions to Consultees

- Do consultees agree with the receptors and impacts scoped out of the EIA?
- Do consultees agree with the proposed ecological survey scope and methodology?
- Are there any developments or infrastructure schemes which should be taken into account when considering potential cumulative ecological impacts?

6. Ornithology

6.1 Introduction

6.1.1 The ornithology chapter will assess the potential significant effects on ornithology during the construction, operational and decommissioning phases of the Proposed Development.

6.1.2 The ornithology chapter of the EIA Report will present the following:

- A summary of consultation responses.
- A description of the existing ornithological baseline for the Proposed Development site and wider ecological study area between 500 m and 2 km from the boundary of the site (zone of influence).



- A description of international, national and local sites designated for their species and habitats, such as SPAs, SSSIs, NNRs and LNCSs will be undertaken within 20 km of the Proposed Development, as well as a review of existing records of protected or otherwise notable species.
- An assessment of the potential significant ornithological impacts of the Proposed Development (including collision risk).
- A comparison of the variation from the previously consented assessment.
- Proposals for appropriate mitigation to ameliorate identified potential impacts (where appropriate).
- An assessment of the residual potential significant impacts following the implementation of mitigation.

6.1.3 This Scoping exercise has been undertaken in accordance with the “Guidelines for Environmental Impact Assessment in the UK and Ireland” (CIEEM, 2018).

6.2 Baseline Description

6.2.1 The Proposed Development site is open moorland and surrounded on the three sides by industrial land, including open areas of mining and large processing plants and then open sea. Further moorland extends south-west. A number of small lochans and the Loch of Kebister are found south-west of the site.

Designations and Data Search

6.2.2 An initial search using publicly available data has revealed a number of statutory European and national nature conservation sites designated for ornithological considerations within 20 km respectively of the site. A number of non-statutory RSPB reserves and Important Bird Areas (IBA) are also present. These designations are detailed in Table 6.1 and shown on Figure 6.1.

Table 6.1 - Ornithological Designation

| Name | Designation | Distance and Direction from the Proposed Development | Reason for Designation |
|---------------------|-------------|--|--|
| East Mainland Coast | SPA | 100 m NE at closest point. | Designated for a number of wintering ducks, divers and grebes including great northern diver (<i>Gavia immer</i>), red-throated diver (<i>Gavia stellata</i>), Slavonian grebe (<i>Podiceps auritus</i>), eider (<i>Somateria mollissima</i>), long-tailed duck (<i>Clangula hyemalis</i>) and red-breasted merganser (<i>Mergus serrator</i>). The site is also selected as an important foraging area for breeding red-throated diver. |
| Moorland Areas | IBA | 3.9 km NW | Moorland breeding bird assemblage. |
| South Bressay | IBA | 4.8 km SE | Breeding skuas. |
| Noss | SPA | 6.5 km SE | Breeding seabird assemblage as well as breeding fulmar (<i>Fulmarus glacialis</i>), gannet (<i>Morus bassanus</i>), great skua (<i>Stercorarius skua</i>), guillemot (<i>Uria aalga</i>), kittiwake (<i>Rissa tridactyla</i>) and puffin (<i>Fratercula arctica</i>). |



| Name | Designation | Distance and Direction from the Proposed Development | Reason for Designation |
|--------------------------|-------------|--|--|
| | SSSI | | Breeding seabird assemblage as well as breeding gannet, great skua, kittiwake and Arctic skua (<i>Stercorarius parasiticus</i>). |
| | NNR | | Seabird Assemblage. |
| | IBA | | Breeding seabird assemblage as well as breeding gannet, great skua and guillemot. |
| Sandwick and Clift Hills | IBA | 14.9 km S | Breeding skuas. |
| West Burrafirth | IBA | 17.5 km NW | Breeding red-throated diver. |
| Ward of Culswick | SSSI | 19 km W | Breeding Arctic skua and whimbrel (<i>Numenius phaeopus</i>). |
| Mousa | RSPB / SSSI | 19 km SSE | Breeding Arctic tern (<i>Sterna paradiseaea</i>), Black guillemot (<i>Cephus grylle</i>) and storm petrel (<i>Hydrobates pelagicus</i>). |

6.3 Guidance and Legislation

Legislation

6.3.1 Relevant legislation documents will be taken into account as part of this ornithological assessment. Of particular relevance are:

- Council Directive 2009/147/EC on the conservation of wild birds (i.e. the Birds Directive");
- The Ramsar Convention on Wetlands (1975);
- The Conservation (Natural Habitats &c.) Regulations 1994 (as amended);
- The Wildlife and Countryside Act (WCA) 1981 (as amended);
- The Wildlife and Natural Environment (Scotland) Act 2011 (as amended);
- The Nature Conservation (Scotland) Act 2004 (as amended);
- The Scottish Biodiversity Strategy, with Scottish priority species and habitats listed on the Scottish Biodiversity List (SBL), is also pertinent and is based on the former UK Biodiversity Action Plan (UK BAP), and regional biodiversity targets defined through the Biodiversity Duty Report for Shetland Islands Council 2015 to 2017 (SIC, 2017); and
- Eaton et al. (2015), Birds of Conservation Concern (BoCC) 4: The Population Status of Birds in the United Kingdom, Channel Islands and the Isle of Man.

Planning Policy

6.3.2 The stand-alone Planning Statement will provide an overview of all the relevant planning policy for the EIA Report. Of particular relevance to this chapter are:

- Shetland Local Development Plan (LDP) (2014);
- SPP (2014);
- Planning Advice Notes; and



- Planning Advice Note (PAN) 60: Planning for Natural Heritage (amended in 2008).

Best Practice Ornithological Guidance

- 6.3.3 As well as detailed consultation with NatureScot, current best practice guidance on assessing ornithological interests in relation to onshore wind farm developments will be followed, of particular relevance to ornithology are the following:
- Guidelines for Ecological Impact Assessment in the UK and Ireland (Chartered Institute of Ecology and Environmental Management (CIEEM), 2018);
 - Guidelines for Environmental Impact Assessment (Institute of Environmental Management and Assessment (IEMA), 2005);
 - Survey Methods for Use in Assessing the Impacts of Onshore Wind Farms on Bird Communities (SNH, 2017);
 - Windfarms and Birds: Calculating a Theoretical Collision Risk Assuming No Avoiding Action (SNH, 2000);
 - Use of Avoidance Rates in the NatureScot Wind Farm Collision Risk Model (SNH, 2018a);
 - Developing field and analytical methods to assess avian collision risk at wind farms (Band et al. 2007); and
 - Assessing the Cumulative Impact of Onshore Wind Energy Developments (SNH, 2012).

6.4 Proposed Scope of Assessment

Proposed Study Area

- 6.4.1 Ornithology surveys will cover the Proposed Development site and appropriate survey buffers.

Study Methodology

- 6.4.2 NatureScot (formerly SNH) guidance recommends a survey period covering a minimum of two years (SNH, 2014). Given the fact that a full suite of ornithology surveys was completed at the Proposed Development site for the original wind farm application (2008 and 2009) and approved, a pragmatic approach is proposed, involving one year of surveys supplemented by the earlier collected data and any available data from the local raptor study group and the RSPB. The data will then be evaluated towards the end of the one-year survey period with a view to determining the value of and requirement for any further survey, in consultation with NatureScot and SIC.
- 6.4.3 It is proposed to undertake the following studies:

Desk Study

- 6.4.4 A desk-based study for the Proposed Development and wider ornithology study area will be undertaken to review the local, regional and national planning framework and other sources of information sources/guidance (in line with CIEEM, 2018), as outlined in the Ecology and Nature Conservation section.
- 6.4.5 The desk study will include a review of the 2011 ES for the consented wind farm.
- 6.4.6 The desk study will additionally seek to identify records of protected or notable bird species within 2 km of the site (10 km for species listed on Annex 1 of the Wildlife and Countryside Act 1981 (as amended)) from statutory and non-statutory organisations; for example, local bird groups and other non-statutory groups, including the local raptor study group.

Vantage Point (VP) Survey

- 6.4.7 A full year of Vantage Point (VP) surveys from two VPs will be undertaken. Surveys commenced in September 2020. The VPs will be located on the highest points of the island, and ground-truthing



was carried out to demonstrate that adequate coverage of the site is feasible. Due to the nature of the site and the undulating ground, it is not considered feasible to locate VPs off-site. Agreement has been received from NatureScot that siting VPs on the site itself is suitable, with appropriate precautions to ensure any disturbance to birds is minimised during the surveys.

- 6.4.8 A minimum of 72 hours of VP survey effort will be undertaken from the confirmed VP locations (36 hours during the breeding season and 36 hours during the non-breeding season). Target species for the vantage point surveys are proposed to be, as a minimum: all Schedule 1 raptors, as relevant, red-throated diver, seabirds, waders and geese. Vantage point surveys will cover the whole year, appropriately stratified to cover dawn, day and dusk in accordance with the NatureScot bird survey methods guidance. They will be carried out in a wind of Beaufort force 4 or less, where feasible, and in dry weather.

Breeding Bird Survey

- 6.4.9 A breeding bird walkover (consisting of four site visits during the breeding months), following adapted Brown & Shepherd method (Gilbert *et al.*, 1998) and with a survey study area extending 500 m beyond the outermost turbine locations.

Breeding Raptor Survey

- 6.4.10 A walkover breeding raptor/scarce breeding bird survey following survey techniques described in Hardey *et al.* (2013), consisting of four survey visits during the breeding months. The survey study area will extend 2 km beyond the outermost turbine locations.

Diver Surveys

- 6.4.11 There are a number of small waterbodies within the south-west of the site as well a larger waterbody (Loch of Kebister) and further small lochans located to the south-west of the site that may be suitable for breeding red-throated diver, as well as historic records of the species breeding in this area. If the breeding bird walkover surveys identify that divers breed on the lochans, then dedicated diver lochan surveys will also be carried out. Focal diver lochans surveys involve undertaking vantage point surveys of the breeding lochans in order to establish the flightpaths of divers from their breeding locations to feeding grounds on the sea. As required by the NatureScot bird survey guidance, we will attempt to record 20-30 flights per breeding lochan.

Collision Risk Modelling

- 6.4.12 The following steps are proposed to inform the assessment of collision risk that will be undertaken in accordance with NatureScot's 'Collision Risk Model' (SNH, 2000):
- Review all digitised flight lines and recorded characteristics for target species (species, number of birds, start time of flight, height at 15-second intervals etc.), from the survey work.
 - Define a turbine envelope and identify all flights which are at any point within the dimensions of the rotor height and which intersect the boundary of the turbine envelope.
 - Calculate the number of transits through the turbine envelope per unit of observation time and extrapolate to determine total predicted transits over the period of interest at risk height.
 - Run the collision model with relevant turbine and ornithological parameters, taking as input the total transits calculated previously.

Ornithological Impact Assessment

- 6.4.13 In accordance with the CIEEM (2018) guidelines, the Ornithology chapter for the EIA Report will present a description of the ornithological baseline for the Proposed Development site and wider ornithology study area. The findings of the survey work will be analysed and presented in one or more technical reports providing baseline conditions of the site. Activities during the construction, operation and decommissioning phases and their potential significance on valuable or vulnerable ornithological features will be identified and direct and indirect effects, including collision risk, will



be assessed, taking account of the above guidelines and the geographical scale at which they are significant. Potential cumulative ornithological effects will also be agreed through consultation for an area up to 20 km from the site boundary and/or Natural Heritage Zone (where applicable). The assessment will additionally present mitigation measures, as required, and assess any residual effects.

- 6.4.14 The assessment will also provide a comparative summary of the change in impacts from the consented 2011 ES against the Proposed Development and indicate whether the assessed effect has changed.

6.5 Potential Mitigation

- 6.5.1 If it is considered that mitigation is necessary to reduce any adverse environmental effects on bird populations, mitigation will be proposed in the ornithological chapter to reduce the significance of these effects to an acceptable level. During the Proposed Development design process mitigation measures will seek to follow the recognised hierarchy of avoidance, reduction, enhancement, and compensation.
- 6.5.2 All ornithological mitigation will be incorporated into a CEMP. This CEMP, to be confirmed, will outline all required mitigation and provide details on timelines for undertaking mitigation for each identified ornithological receptor. This CEMP will also outline timetable of actions and form part of the contract documents to ensure delivery of mitigation specified in the chapter. In addition, the CEMP should incorporate the provision of an Ecological Clerk of Works (ECoW) to oversee the implementation of recommended mitigation.

6.6 Potential Impacts

- 6.6.1 The key ornithology issues to be considered for the Proposed Development will include the following:
- Potential for Schedule 1 or other notable raptors, and divers, to be displaced by the Proposed Development or suffer direct mortality through collision with turbines.
 - Potential for breeding birds (including waders) within or adjacent to the site to be disturbed and/or displaced as a result of the Proposed Development (individuals may also collide with the turbines).
 - Cumulative collision risk with other wind farms in the local area.
 - Potential to impact on qualifying species of the East Mainland Coast SPA.

6.7 Scoping Questions to Consultees

- Do consultees agree with the receptors and impacts scoped out of the EIA?
- Do consultees agree with the proposed ornithological survey scope and methodology?
- Are there any developments or infrastructure schemes which should be taken into account when considering potential cumulative ornithological impacts?

7. Archaeology and Cultural Heritage

7.1 Introduction

- 7.1.1 This chapter of the EIA Scoping Report outlines the baseline archaeological and cultural heritage conditions at the site and outlines the methodology that will be utilised for the identification and assessment of the effect on heritage assets within the EIA Report. This chapter also considers the



potential for significant effects on heritage assets arising from the Proposed Development and highlights instances where mitigation measures may be required.

- 7.1.2 This chapter of the EIA Scoping Report has been produced by AOC Archaeology Group, a Registered Organisation of the Chartered Institute for Archaeologists (CIfA)

7.2 Baseline Description

- 7.2.1 The Historic Landuse Assessment (Historic Environment Scotland) indicates that the majority of the site comprises late twentieth century to present day Moorland and Rough Grazing. Historic map evidence indicates that the site was undeveloped and entirely covered by open moorland until the construction of the operational turbine.
- 7.2.2 The Scottish Palaeoecological Database (SPAD) does not record any palaeoecological sites within the site. However, an archaeological watching brief at Gremista, to the east of the site, recorded thick deposits of peat and thus the site has the potential to preserve palaeoenvironmental remains.
- 7.2.3 Previous archaeological surveys in the vicinity of the site include those undertaken for the previously consented turbine locations and in advance of the construction of the oil rig supply base at Dales Voe (the Kebister Project). These surveys identified well-preserved archaeological remains ranging from the Bronze Age through to the early 19th century. There are 22 non-designated heritage features within 1 km of the site (Appendix 7.1). Archaeological evidence is concentrated near the shores of Dales Voe, west of the site and west of the Kebister March Dyke (Figure 7.1). However, numerous archaeological features extend into the site. Heritage features within the site include a possible prehistoric cairn (Site 1), a post-medieval structure (Site 26) and a length of sub-peat dyke (Site 27). Vatsland (Site 25) north of the site was a small satellite settlement of Kebister (Site 2). Together, Kebister and Vatsland were the foci of a 'scattald' (a settlement district with exclusive pasture paying 'scat' to the crown). By the 16th century, Kebister and Vatsland were part of the estates of the archdeacon of Shetland (Owen and Lowe 1999).
- 7.2.4 Eleven Scheduled Monuments are located within 5 km of the site (Figure 7.2), including the excavated remains of the Teind barn, 120 m N of Kebister (Scheduled Monument, Index no. 11262). The remains comprise evidence for a substantial post-medieval structure identified as a probable Teind barn dating from the early 16th century. The remains of the Teind Barn are located 375 m west of the site. Between 5 km and 10 km of the site, a further 48 Scheduled Monuments are recorded.
- 7.2.5 Listed Buildings within the 5 km study area include 127 structures within Lerwick Conservation Area including the Category A Listed Town Hall. Listed Buildings on the island of Bressay include Heogan Fishing Station, Gardie House, pier and steading, Maryfield Boat Store Bressay Kirk, Mizpah House and The Glebe. The nearest Listed Building to the site is the Category B Listed Bod of Gremista located 1.3 km to the south-southeast (Figure 7.2).
- 7.2.6 Gardie House Inventory Garden and Designed Landscape is located 3.3 km south-east of the site and is situated on the west coast of Bressay. The Designed Landscape comprises symmetrical rectilinear walled enclosures, and courtyard gardens set symmetrically around the mansion house and leading down to Gardie Pier.
- 7.2.7 There are no World Heritage Sites or Inventoried Battlefields within 10 km of the site.

7.3 Guidance and Legislation

- 7.3.1 The EIA Report will be prepared in accordance with relevant national and local legislation, policy, and guidance on the historic environment:

Legislation

- The Ancient Monuments and Archaeological Areas Act 1979 (as amended).



- The Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997 (as amended).
- The Planning etc. (Scotland) Act 2006.
- Historic Environment (Amendment) (Scotland) Act 2011.
- Historic Environment (Scotland) Act 2014.
- The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended).

Policy

- SPP (Scottish Government, 2014).
- Historic Environment Policy for Scotland (HEPS) (HES 2019a), including Designation Policy and Selection Guidance (HES, 2019b).
- The adopted Shetland Islands Local Development Plan (SIC, 2014).

Guidance

- Planning Advice Notes (PAN) for Scotland in particular PAN 2/2011 'Archaeology and Planning' (Scottish Government, 2011).
- Managing Change in the Historic Environment: Setting (HES, 2020).
- NatureScot & HES's published guidance contained within 'Environmental Impact Assessment Handbook v5' (SNH & HES, 2018).
- Policy SGHE 3 of the Supplementary Planning Guidance for Shetland Islands Council (SIC, 2012);
- Chartered Institute for Archaeologists (CIfA) Code of Conduct (2014- Updated 2020).
- CIfA Standard and guidance for commissioning work or providing advice on archaeology and the historic environment (2014).
- CIfA Standard and guidance for historic environment desk-based assessment (2014)

7.4 Proposed Scope of Assessment

Proposed Study Area

7.4.1 In order to assess the potential for significant effects on cultural heritage assets resulting from the Proposed Development, the following study areas have been identified:

- A core study area (the site) which includes all land within the site boundary which will be subject to assessment for potential direct effects. This study area will be subject to detailed walkover survey and will be used to identify cultural heritage assets which may be directly affected by the Proposed Development.
- A 1 km study area for the identification of all known heritage features and known previous archaeological interventions in order to help predict whether any similar hitherto unknown archaeological remains are likely to survive within the site and thus be impacted by the Proposed Development.
- A 5 km study area for the assessment of potential effects on the settings of all designated heritage assets including Scheduled Monuments; all Listed Buildings; Inventoried Gardens and Designed Landscapes and Conservation Areas.
- A 10 km study area for the assessment of potential effects on the settings of all nationally important designated heritage assets including Scheduled Monuments; Category A Listed Buildings; and Inventoried Gardens and Designed Landscapes.



Assessment Methodology

- 7.4.2 The assessment will establish the historic environment baseline for the site. Baseline data will be collated from the following sources:
- Historic Environment Scotland (HES) for:
 - National Record of Historic Environment (NRHE) Data;
 - Designated asset data; and
 - Published and unpublished archaeological reports.
 - The SIC Sites and Monuments Record (SMR) for:
 - Non-designated heritage asset data as recorded on the Shetland SMR;
 - Unpublished archaeological reports (Events).
 - National Library for Scotland for:
 - Ordnance Survey maps and pre-Ordnance Survey historical maps
 - Shetland Archives & Museum Service for:
 - Historical maps, plans and documents relating to past land use.
 - National Collection of Aerial Photography (NCAP), held by HES, for:
 - Historic aerial photographs.
 - Scottish Remote Sensing Portal for:
 - LiDAR data
 - Walkover Survey:
 - A detailed walkover survey will be undertaken across the entirety of the site in order to identify any hitherto unrecorded upstanding or earthwork remains which may survive.
 - Setting assessment site visits
 - A visit to designated assets with the potential to be impacted by the Proposed Development to establish their current settings.
 - A review of the 2011 ES for the consented wind farm.
- 7.4.3 The EIA Report chapter will fully describe the baseline historic environment conditions and will assess the potential for direct impacts upon known heritage assets within the site and will outline the potential for hitherto unknown buried remains to survive on-site, and thus potentially be impacted upon. The assessment will also consider the identified heritage assets in the area surrounding the site, which could be subject to potential impacts upon setting, including the potential for cumulative impacts. The EIA Report chapter will be supported by a detailed ZTV which will be used to identify assets intervisible with the Proposed Development and/or where the Proposed Development would appear in key views to and from assets. It is envisaged that visualisations (either wireframes or photomontages) will be produced for some assets to aid in the assessment of settings impacts. The viewpoints required will be agreed in consultation with HES, The Shetland Regional Archaeologist and the project's LVIA consultants.
- 7.4.4 The assessment will distinguish between the term 'impact' and 'effect'. An impact is defined as a physical change to a heritage asset or its setting, whereas an effect refers to the significance of this impact. The first stage of the assessment will involve establishing the importance of the heritage asset and assessing the sensitivity of the asset to change (impact). Using the proposed design for the Proposed Development, an assessment of the impact magnitude will be made, and a judgement regarding the level and significance of effect will be arrived at.



7.4.5 The rating of importance of heritage assets will first and foremost be made in reference to their designation. For non-designated assets importance will be assigned based on professional judgement and guided by the criteria presented in Table 7.1; which itself relates to the criteria for designations as set out in Designation Policy and Selection Guidance (HES 2019b) and Scotland’s Listed Buildings (HES 2019c).

Table 7.1 - Criteria for Establishing Importance of Heritage Assets

| Importance | Receptors |
|------------|---|
| Very High | World Heritage Sites; or Other designated or non-designated assets with demonstrable Outstanding Universal Value. |
| High | Scheduled Monuments (as protected by the Ancient Monuments and Archaeological Areas Act 1979 (the "1979 Act"); Category A Listed Buildings (as protected by the Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997) (the "1997 Act"); Inventory Gardens and Designed Landscapes (as protected by the 1979 Act, as amended by the Historic Environment (Amendment) (Scotland) Act 2011); Inventory Battlefields (as protected by the 1979 Act, as amended by the 2011 Act); Outstanding examples of some period, style or type; or Non-designated assets considered to meet the criteria for the designations as set out above (as protected by SPP, 2014). |
| Medium | Category B and C Listed Buildings (as protected by the 1997 Act); Conservation Areas; Major or representative examples of some period, style or type; or Non-designated assets considered to meet the criteria for the designations as set out above (as protected by SPP, 2014); |
| Low | Locally Listed assets; or Examples of any period, style or type which contribute to our understanding of the historic environment at the local level. |
| Negligible | Relatively numerous types of features; Findspots of artefacts that have no definite archaeological remains known in their context; or The above non-designated features as protected by Paragraph 137 of SPP, 2014. |

7.4.6 Determining cultural heritage significance can be made with reference to the intrinsic, contextual and associative characteristics of an asset and/or feature as set out in HEPS (HES, 2019a) and its accompanying Designation Policy and Selection Guidance (HES, 2019b). HEPS Designation Policy and Selection Guidance (2019b) indicates that the relationship of an asset to its setting or the landscape makes up part of its contextual characteristics. While SPP does not differentiate between the importance of the asset itself and the importance of the asset’s setting, HES’s Managing Change Guidance, in defining what factors need to be considered in assessing the impact of a change on the setting of a historic asset or place states that the magnitude of the proposed change should be considered “relative to the sensitivity of the setting of an asset” (HES 2020, 11) thereby making clear that assets vary in their sensitivity to changes in setting and thus have a relative sensitivity. The EIA Handbook suggests that cultural significance aligns with sensitivity but also states that “the relationship between value and sensitivity should be clearly articulated in the assessment” (HES and



SNH 2018, 184). It is therefore recognised (ibid.) that the importance of an asset is not the same as its sensitivity to changes to its setting. Elements of setting may make a positive, neutral or negative contribution to the significance of an asset. Thus, in determining the nature and level of effects upon assets and their settings by the development, the contribution that setting makes to an asset's significance and thus its sensitivity to changes to setting will be considered.

- 7.4.7 The criteria that will be used for establishing an asset's relative sensitivity to changes to its setting is detailed in Table 7.2. This table has been developed based on AOC's professional judgement and experience in assessing setting effects. It has been developed with reference to the policy and guidance noted above including SPP (Scottish Government 2014), HEPS (HES 2019a) and its Designation Policy and Selection Guidance (HES 2019b), the Xi'an Declaration (ICOMOS 2005), the EIA Handbook (SNH & HES 2018) and HES's guidance on the setting of heritage assets (HES 2020).

Table 7.2 – Criteria for Establishing Relative Sensitivity of a Heritage Asset to Changes to its Setting

| Relative Sensitivity | Criteria |
|----------------------|---|
| Very High | An asset, the setting of which, is critical to an understanding, appreciation and experience of it should be thought of as having Very High Sensitivity to changes to its setting. This is particularly relevant for assets whose settings, or elements thereof, make an essential direct contribution to their cultural significance (e.g. form part of their Contextual Characteristics (HES, 2019b, Annex 1)). |
| High | An asset, the setting, of which, makes a major contribution to an understanding, appreciation and experience of it should be thought of as having High Sensitivity to changes to its setting. This is particularly relevant for assets whose settings, or elements thereof, contribute directly to their cultural significance (e.g. form part of their Contextual Characteristics (HES, 2019b, Annex 1)). |
| Medium | An asset, the setting of which, makes a moderate contribution to an understanding, appreciation and experience of it should be thought of as having Medium Sensitivity to changes to its setting. This could be an asset for which setting makes a contribution to significance but whereby its value is derived mainly from its other characteristics (HES 2019b). |
| Low | An asset, the setting of which, makes some contribution to an understanding, appreciation and experience of it should generally be thought of as having Low Sensitivity to changes to its setting. This may be an asset whose value is predominantly derived from its other characteristics |
| Marginal | An asset whose setting makes minimal contribution to an observer's understanding, appreciation and experience of it should generally be thought of as having Marginal Sensitivity to changes to its setting. |

- 7.4.8 The determination of a heritage asset's relative sensitivity to changes to its setting is first and foremost reliant upon the determination of its setting and the key characteristics of setting which contribute to its cultural significance and an understanding and appreciation of that cultural significance. This aligns with Stage 2 of the HES guidance on setting (2020, 9). The criteria set out in Table 7.2 are intended as a guide. Assessment of individual heritage assets will be informed by knowledge of the asset itself; of the asset, type if applicable and by site, visits to establish the current setting of the assets. This will allow for the use of professional judgement, and each asset is assessed on an individual basis unless otherwise indicated.

- 7.4.9 Potential impacts that is the physical change to known heritage assets, and unknown buried archaeological remains, or changes to their settings, in the case of the Proposed Development relate to the possibility of disturbing, removing or destroying in situ remains and artefacts during the



construction phase or the placement of new features within their setting during the operational phase.

7.4.10 The magnitude of the impacts upon heritage assets caused by the Proposed Development will be rated using the classifications and criteria outlined in Table 7.3.

Table 7.3- Criteria for Classifying Magnitude of change

| Magnitude of change | Criteria |
|---------------------|--|
| High | Substantial loss of information content resulting from total or large-scale removal of deposits from an asset; Major alteration of an asset's baseline setting, which materially compromises the ability to understand, appreciate and/or experience the contribution that setting makes to the significance of the asset and erodes the key characteristics (HES 2020) of the setting. |
| Medium | Loss of information content resulting from material alteration of the baseline conditions by removal of part of an asset; Alteration of an asset's baseline setting that effects the ability to understand, appreciate and/or experience the contribution that setting makes to the significance of the asset to a degree but whereby the cultural significance of the monument in its current setting remains legible. The key characteristics of the setting (HES 2020) are not eroded. |
| Low | Detectable impacts leading to minor loss of information content. Alterations to the assets baseline setting, which do not affect the ability to understand, appreciate and/or experience the contribution that setting makes to the asset's overall significance. |
| Negligible | Loss of a small percentage of the area of an asset's peripheral deposits; A reversible alteration to the fabric of the asset; A marginal alteration to the asset's baseline setting. |
| None | No effect predicted |

7.4.11 The predicted level of effect on each heritage asset will be determined by considering the asset's importance in conjunction with the predicted magnitude of the impact. The method of deriving the level of effect is provided in Table 7.4.

Table 7.4 - Level of Effects based on Inter-Relationship between the Sensitivity of a Heritage Asset and/or its setting and the Magnitude of Impact

| Magnitude of Impact | Sensitivity | | | | |
|---------------------|-------------|----------|--------------------|--------------------|--------------------|
| | Very High | High | Medium | Low | Negligible |
| High | Major | Major | Moderate | Moderate | Minor |
| Medium | Major | Moderate | Moderate | Minor | Negligible/Neutral |
| Low | Moderate | Minor | Minor | Negligible/Neutral | Negligible/Neutral |
| Negligible | Minor | Minor | Negligible/Neutral | Negligible/Neutral | Negligible/Neutral |

7.4.12 The level of effect is judged to be the interaction of the asset's importance and/or relative sensitivity (Tables 7.1 and/or 7.2) and the magnitude of the impact (Table 7.3). In order to provide a level of consistency, the assessment of the importance and relative sensitivity, the prediction of the



magnitude of impact and the assessment of the level of effect will be guided by pre-defined criteria. However, a qualitative descriptive narrative will also be provided for each asset to summarise and explain each of the professional value judgements that have been made in establishing sensitivity and magnitude of impact for each individual asset.

- 7.4.13 Using professional judgment and with reference to the Guidelines for Environmental Impact Assessment (as updated) (IEMA, 2017), and the EIA Handbook (2018) the assessment will consider moderate and greater effects to be significant (shaded grey in Table 7.4), while minor and lesser effects will be considered not significant.
- 7.4.14 SPP notes that where there is potential for a proposed development to have an adverse effect on a Scheduled Monument or on the integrity of its setting, permission should only be granted where there are 'exceptional circumstances'. Adverse effects on integrity of setting are judged here to relate to whether a change would adversely affect those attributes or elements of setting which contribute to an asset's significance to the extent that the ability to understand and appreciate the asset is diminished.
- 7.4.15 In terms of effects upon the setting of heritage assets, it is considered that only those effects identified as 'significant' in the assessment will have the potential to adversely affect the integrity of the setting. Where no significant effect is found, it is considered that the integrity of an asset's setting will remain intact. This is because for many assets, the setting may make a limited contribution to their significance and as such changes would not affect the integrity of their settings. Additionally, as set out in Table 7.3, lower ratings of magnitude of change relate to changes that would not obscure or erode key characteristics of the setting.
- 7.4.16 Where significant effects are found, a detailed assessment of adverse effects upon the integrity of setting will be made. Whilst non-significant effects are unlikely to affect the integrity of setting, the reverse is not always true. That is, the assessment of an effect as being 'significant' in EIA terms does not necessarily mean that the effect on the asset's setting will harm its integrity. The assessment of adverse effect upon the integrity of an asset's setting, where required, will be a qualitative one, and will largely depend upon whether the effect predicted would result in a major impediment to the ability to understand or appreciate the heritage asset and therefore reduce its cultural significance.
- 7.4.17 The assessment will also provide a comparative summary of the change in impacts from the consented 2011 ES against the Proposed Development and indicate whether the assessed effect has changed.

Cumulative Assessment

- 7.4.18 The assessment of cumulative effects on heritage assets will be based upon consideration of the effects of the Proposed Development on the settings of designated heritage assets within the 5 km and 10 km study areas, in addition to the likely effects of other operational/under construction, consented and proposed (at the application and scoping stages) wind farm schemes.
- 7.4.19 The assessment will take into account the relative scale (i.e. size and number of turbines) of the identified developments, their distance from the affected assets, and the potential degree of visibility of the various developments from the assets. Cumulative wirelines from those assets most likely to experience significant cumulative impacts on their settings will be provided.
- 7.4.20 The schemes to be included in the cumulative impact assessment will be those identified through the proposed consultations with the SIC and NatureScot and will be undertaken according to the guidance in Historic Environment Scotland's Environmental Impact Assessment Handbook (HES & SNH 2018).



Receptors and Impacts Scoped Out of Assessment

- 7.4.21 Impacts on the settings of non-designated heritage assets and features will be scoped out of the assessment as these assets are generally considered less sensitive to changes in their settings and are judged to be unlikely to be subject to significant settings effects
- 7.4.22 Impacts on the settings of heritage assets beyond 10 km of the Proposed Development will be scoped out, as most assets beyond that distance will be too far distant to have their settings significantly adversely affected by the Proposed Development.
- 7.4.23 A detailed assessment of the cultural heritage impacts of decommissioning the Proposed Development will be scoped out of the EIA because; (i) the future baseline conditions (environmental and other developments) cannot be predicted accurately at this stage; (ii) the detailed proposals for decommissioning are not known at this stage, and (iii) the best practice decommissioning guidance methods will likely change during the lifetime of the Proposed Development.

7.5 Potential Mitigation

- 7.5.1 National planning policies and planning guidance, as well as the local planning policies, require that account is taken of potential effects upon heritage assets by proposed developments and that where possible such effects are avoided. Where avoidance is not possible, these policies require that any significant effects are minimised or offset.
- 7.5.2 The Proposed Development will be designed to avoid direct impacts on known heritage features.
- 7.5.3 Given the presence of known heritage features and the potential for presently unknown archaeological remains to be buried beneath peat on the site, a programme of archaeological works will be undertaken prior to the commencement of construction of the Proposed Development. Details of the proposed programme of archaeological works will be presented in the EIA Report.
- 7.5.4 The Proposed Development turbine layout will be designed where possible, to minimise impacts on the settings of designated heritage assets. Where avoidance of impacts is not possible appropriate additional compensatory mitigation will be proposed.

7.6 Potential Impacts

- 7.6.1 The Proposed Development would have the potential to result in a direct impact on hitherto unknown buried archaeological and palaeoenvironmental remains.
- 7.6.2 The Proposed Development would have the potential to result in impacts (including cumulative impacts) on the settings of heritage assets in the wider landscape. A 10 km study area extending from the site boundary will be employed, along with consultation with statutory consultees, to identify assets to be assessed in the EIA Report.

7.7 Scoping Questions to Consultees

- 7.7.1 Is the proposed assessment methodology, including proposed study areas, accepted?
- 7.7.2 Category A Listed Buildings will be subject to individual settings assessment. Given the high number of Listed Buildings within the Lerwick Conservation Areas, it is proposed to assess the settings of Category B and C Listed Buildings within the Conservation Areas designations as part of the wider Conservation Area setting assessments. Are consultees happy with this approach?
- 7.7.3 Are there any assets beyond the proposed study areas that consultees would like to see scoped into the assessment?



8. Noise

8.1 Introduction

- 8.1.1 This chapter considers the potential issues associated with the environmental impact of noise and vibration during the construction, operational and decommissioning phases of the Proposed Development, which will require further consideration within the EIA.

8.2 Guidance and Legislation

- 8.2.1 For a development of this nature, there is no specific all-encompassing legislation relating to the standard associated with noise and vibration impacts. In lieu of any specific legislation, assessing the effect of such a development during the construction, operational and decommissioning phases must draw on information from a variety of sources. This assessment, therefore, makes reference to a number of British Standards, official planning guidance notes and national guidelines.
- 8.2.2 As stipulated in the SPP (Scottish Government, 2014), the operational phase noise assessment will be undertaken in accordance with the guidance set out in the Energy Technical Support Unit (ETSU) document entitled, 'The Assessment and Rating of Noise from Wind Farms' (ETSU-R-97) (ETSU, 1996). The assessment also considers the guidance contained within the Institute of Acoustics' document 'A good practice guide to the application of ETSU-R-97 for the assessment and rating of wind turbine noise' (IoA GPG) (Institute of Acoustics, 2013), which is accepted within supplementary guidance notes referenced by SPP as representing current industry good practice (Scottish Government, 2014).
- 8.2.3 ETSU-R-97, prepared by a Working Group on Wind Turbine Noise assembled at the behest of the then Department of Trade and Industry, provides guidance and methodology for the prediction and assessment of noise from wind farms. The fundamental approach of ETSU-R-97 is the determination of appropriate allowable noise level limits with which an operational wind turbine development should comply. These operational noise limits are derived from representative measurements of pre-development ambient noise at a range of wind speeds and directions at locations representative of the closest noise-sensitive receptors. A cumulative noise impact assessment, to be agreed through further detailed consultation with the Environmental Health Department of SIC, will also take into consideration any other proposed, consented and/or existing wind energy developments in the vicinity of the Proposed Development.
- 8.2.4 Current national guidance and policy on wind turbine noise assessment indicate that specific assessments of vibration, infrasound, low-frequency noise and excess amplitude modulation outside the scope of ETSU-R-97 and the IoA GPG are not required at the planning stage for proposed onshore (free-standing) wind turbine developments. Therefore, these matters have not been considered in the assessment of operational noise impact.

8.3 Proposed Scope of Assessment

Construction and Decommissioning Effects

- 8.3.1 Construction noise was predicted and evaluated for the original three-turbine layout in the 2011 ES, and it was determined that even under the most intense period of engineering works, noise at noise sensitive receptors (NSRs) would not exceed the most stringent criterion derived from BS5228 and would therefore not be significant. We assume that construction noise associated with the Proposed Development would similarly meet the criterion and therefore, no significant effects on the environment would occur.
- 8.3.2 Detailed information on construction and decommissioning techniques and equipment is unlikely to be available at the planning stage. The potential noise and vibration effects associated with the construction and decommissioning phase can be adequately controlled by the implementation of



a CEMP. The assessment would adopt appropriate fixed criteria presented in British Standard 5228-1:2009 'Noise and vibration control on construction and open site. Part 1: Noise' (British Standards Institution, 2009). We, therefore, propose to scope out prediction and evaluation of construction noise.

- 8.3.3 Consideration will also be given to the noise level changes that would arise as a result of the additional traffic on the local road network during the construction phase of the development. The changes in noise levels would be predicted using the Department of Transport's methodology for the 'Calculation of Road Traffic Noise' 1988 (CRTN) (Department of Transport, 1988).
- 8.3.4 Any potential noise or vibration effects associated with these phases will be minimised through the obligation of Contractors to apply the principles of Best Practicable Means, as defined in the Control of Pollution Act (1974).

Operational Effects

- 8.3.5 No significant sources of vibration will be present during the operational phase. Therefore, no assessment of operational phase vibration is proposed.
- 8.3.6 The assessment methodology for operational wind turbine noise impacts requires determination of daytime and night-time noise limits at the nearest NSRs, which are aimed at minimising adverse impacts on both daytime amenity and night-time sleep. The nearest NSRs to the Proposed Development include Gremista Farm, Gremista Road, College, Gremista Road North, South Califf and Califf (refer to Figure 8.1).
- 8.3.7 In order to determine the noise levels that would be generated by the proposed wind turbines, a detailed three-dimensional noise prediction model will be prepared for the site and the surrounding area. The prediction model will use the calculation algorithms from ISO 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors (ISO 9613-2) (International Organization for Standardization, 1996). The noise prediction modelling will be carried out in accordance with the IoA GPG and will take into account specific information available with regard to the type and specification of the candidate turbines proposed. Furthermore, predicted noise levels will include appropriate corrections for topographic screening and concave ground in accordance with the IoA GPG method, where applicable.
- 8.3.8 ETSU-R-97 states that where it can be demonstrated that the predicted levels of wind turbine noise would not exceed 35 dB L_{A90} at a property, then no background noise survey is required. A simplified operational noise condition will be sufficient to protect those NSRs where turbine noise is predicted not to exceed 35 dB L_{A90} . Where the simplified operational noise limit cannot be met, the ETSU-R-97 detailed assessment methodology allows the determination of appropriate noise limits relative to measured background noise levels.
- 8.3.9 Figure 8.1 presents the 35 dB noise contour for the Proposed Development. There are no NSRs within the noise contour. Therefore, a background noise survey is not required. For EIA purposes, the baseline noise environment will, therefore, be characterised by desk study. Using ETSU-R-97 the overall fixed minimum daytime noise limit should be 35 dB $L_{A90,10min}$, and the overall fixed minimum night-time noise limit should be 38 dB $L_{A90,10min}$. The operational noise limits in the assessment will therefore not vary with wind speed/background noise levels and will be 'flat'. This approach will be agreed with SIC Environmental Health Department in direct communication.
- 8.3.10 The results of the Proposed Development's predicted turbine noise levels, at each identified NSR will be assessed against the flat operational noise limits when assessed in accordance with detailed ETSU-R-97 assessment methodology. Based on this assessment, the significance of any predicted noise impacts associated with the operational development will be assessed with reference to appropriate guidance.
- 8.3.11 It is anticipated that there will not be a significant change to road traffic flows due to the operational phase of the Proposed Development. Operational road traffic noise has therefore been scoped out of the EIA.



Cumulative Effects

- 8.3.12 Any cumulative assessment undertaken will be carried out in accordance with the IoA GPG and will consider proposed, consented and/or existing wind farms in the vicinity of the Proposed Development site, where necessary. The IoA GPG states that a cumulative noise impact assessment is necessary if the Proposed Development produces noise levels within 10 dB of any existing wind farm(s) at the same NSR.
- 8.3.13 The exact scope of the cumulative noise assessment will be agreed through further detailed consultation with the Environmental Health Department of SIC. If required, the resultant predicted turbine noise levels generated by the operation of all existing, consented and proposed wind farms and single turbines in the vicinity of the development site will be assessed in accordance with the adopted operational noise limits.
- 8.3.14 Figure 8.1 shows the cumulative noise contour of operational wind farms that are within 5 km of the Proposed Development. The areas where cumulative effects occur are uninhabited, and therefore no significant cumulative effects are anticipated.

8.4 Potential Mitigation

- 8.4.1 Where the assessment indicates that the significance of noise effects is expected to be greater than 'minor', i.e. predicted cumulative noise levels exceed derived noise limits, appropriate potential schemes of mitigation will be presented to demonstrate how compliance with the limits could be achieved.
- 8.4.2 For the construction and decommissioning phases of the Proposed Development, a CEMP will be implemented to provide adequate mitigation. With regard to the assessment of the operational phase, this mitigation could include an assessment of the suitability of the proposed positioning of each of the turbines relative to the closest noise-sensitive receptors or other measures such as reduced noise operating modes or curtailment under particular wind speeds and directions.
- 8.4.3 The residual effects incorporating any change in impact magnitude due to proposed mitigation will then be considered and assessed for their significance.
- 8.4.4 The assessment will also provide a comparative summary of the change in impacts from the consented 2011 ES against the Proposed Development and indicate whether the assessed effect has changed.

8.5 Key Issues for Consideration in the EIA

- 8.5.1 The key issues to be considered with respect to noise and vibration and the Proposed Development are likely to include the following:
- operational noise effects, including any likely cumulative noise effects when the noise from other proposed, consented and/or existing wind farms in the vicinity are also considered.
- 8.5.2 Operational traffic noise and operational vibration have been scoped out of further assessment.

8.6 Scoping Questions to Consultees

- 8.6.1 Do you agree with the proposed methodology set out above?
- 8.6.2 Do you agree with the proposal to scope out the following from further assessment:
- operational traffic noise;
 - operational vibration;
 - construction noise; and



- decommissioning phase noise?

9. Access, Traffic and Transport

9.1 Introduction

- 9.1.1 The chapter covers the predicted transport and access issues that may arise from the construction of the Proposed Development and relevant mitigation measures as required. No impacts are predicted during the operation or decommissioning of the Proposed Development.

9.2 Baseline Description

- 9.2.1 The operational site entrance is located on the unclassified Gremista Road, approximately 500 m from the entrance to the Dales Voe port facility, where the road terminates. The total length of the Gremista Road is approximately 4 km, from its junction with the A970 to the Dales Voe port.
- 9.2.2 Gremista Road serves the Gremista Industrial Estate and the Dales Voe port with few businesses directly fronting the road and no facilities for pedestrians.
- 9.2.3 Turbine components for the operational turbine were transported to Shetland by sea, then delivered from the Greenhead port terminal and transferred along the Gremista road for approximately 1 km to site.
- 9.2.4 It is considered that the Proposed Development will use the same port of entry and access route to the site.

9.3 Guidance and Legislation

- 9.3.1 The following policy and guidance documents will be used to inform the assessment:
- Transport Assessment Guidance (Transport Scotland, 2012);
 - The Guidelines for the Environmental Assessment of Road Traffic (Institute of Environmental Assessment (IEA), 2003);
 - SPP (Scottish Government, 2014); and
 - SIC Local Development Plan (2014).

9.4 Proposed Scope of Assessment

Construction Phase

- 9.4.1 The Transport and Access chapter for the 2011 ES assessed the impacts of the three consented turbines and determined that the main impacts would be associated with the movement of heavy goods vehicles (HGVs) during the construction phase. It determined there would be approximately 1,460 loads in total generated across the construction phase. The assessment considered all potential construction phase impacts to be not significant.
- 9.4.2 As assessed in the 2011 ES, it is proposed to import required volumes of aggregate for construction from elsewhere on Shetland.
- 9.4.3 We consider that the impacts of the Proposed Development on traffic and transport will be less than those assessed within the 2011 ES and that the change in layout will not have a material difference on anticipated construction traffic. Any change in anticipated trips will result in a lower or negligible difference and therefore will not result in a significant impact.



- 9.4.4 It is considered that the same route and method of delivery for abnormal loads previously used remains appropriate, and the findings of the Route Access Report undertaken for the 2011 ES remain valid. Therefore, it is proposed to scope out the need for a detailed Transport Assessment.
- 9.4.5 The EIA Report will provide details of the proposed new on-site access tracks and an overview of the anticipated traffic and transport impacts during construction.

Operation & Decommissioning

- 9.4.6 The 2011 ES determined that the construction phase was the only phase of the development when potential, although non-significant, impacts were anticipated to occur. It is considered that the traffic and transport assessment undertaken for the 2011 ES is representative of the potential impacts of the Proposed Development. Therefore, it is considered that there will be no significant impacts during the operational or decommissioning phases.
- 9.4.7 The potential increase in operational traffic from the current baseline of the operational turbine with the introduction of the Proposed Development will be negligible.
- 9.4.8 It is therefore proposed to scope operational and decommissioning impacts out of further assessment.

9.5 Potential Mitigation

- 9.5.1 As per the 2011 ES, although no significant impacts are anticipated, the following mitigation measures would be implemented as good practice:
- wheel washing facilities will be installed on the access road if required;
 - abnormal load vehicle escorts and timing of deliveries would be within quiet periods; and
 - specific travel routes to and from the site on the local road network will be defined for construction vehicles.
- 9.5.2 It is anticipated that these measures could be secured via a suitably worded condition of planning. If considered necessary, a Traffic Management Plan will be agreed with the local roads authority prior to commencement of construction.

9.6 Potential Impacts

- 9.6.1 It is therefore proposed that there will be no significant impacts on traffic and transport as a result of the Proposed Development.
- 9.6.2 The EIA Report will include a short section providing an overview of the potential impacts as assessed within the 2011 ES and any proposed mitigation measures as detailed above, in line with good practice guidance.

9.7 Scoping Questions to Consultees

- 9.7.1 Do you agree with the proposed approach to the transport assessment?
- 9.7.2 Do you agree it appropriate to scope out operational and decommissioning impacts?



10. Hydrology, Hydrogeology, Geology and Peat

10.1 Introduction

10.1.1 This section will assess the potential effects arising from the Proposed Development on hydrology and hydrogeology receptors, i.e. surface water and groundwater, as well as geology and peat, including peat stability. Proposed surveys and assessment methodologies are outlined to develop mitigation measures to prevent or reduce identified potential effects.

10.2 Baseline Description

10.2.1 There are no major watercourses on or immediately surrounding the site. Ordnance Survey (OS) mapping indicates drainage channels associated with the nearby waste management and recycling centre to the east of the site, understood to be land drainage and an onsite water management pond. The Loch of Kebister is located approximately 20 m west of the site and unnamed minor lochans are located in the west of the site in a topographically flat area. The Burn of Kebister is located immediately west of the western site boundary and discharges to Dales Voe approximately 460 m west of the site (refer to Figure 10.1).

10.2.2 The hydrological regimes of local catchments on the site discharge to a variety of watercourses/water bodies including;

- the Burn of Kebister in the west;
- the Loch of Kebister and associated downstream minor watercourses in the south west;
- the landfill land drainage channels in the south east; and
- directly to the sea on either side of the peninsula.

10.2.3 A watercourse crossing survey was carried out in October 2020 where two minor watercourses were recorded adjacent to the proposed infrastructure.

10.2.4 The following coastal waters surrounding the peninsula have been identified using SEPA interactive environment map;

- Dales Voe (South Mainland) to the west;
- The Keen to Isle of Noss to the north; and
- Bressay Sound.

10.2.5 Each of these coastal waters are identified as having a Good classification.

10.2.6 The 1:50,000 British Geological Survey (BGS) Superficial Geology Map from the BGS Onshore GeoIndex Viewer indicates that the superficial geology underlying the site comprises entirely of peat (Figure 10.2). This is supported by a Stage 1 peat survey carried out in October 2020, during which varying peat depths were recorded (Figure 10.3). Natural peat depths were recorded, ranging from 30 cm to greater than 3 m. Peat depths will be appropriately considered to inform the site design and infrastructure layout.

10.2.7 The majority of the peat across the site is recorded as Class 1 on NatureScot's Carbon and Peatland Map (SNH, 2016), which is the highest importance. Class 1 peat is nationally important carbon rich soils, deep peat and priority peatland habitat. Class 1 areas are likely to be of high conservation value. In the north of the site towards the site boundary, the peat is recorded as Class 3 and Class 5 importance. In Class 3 peat, the dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type. Occasional peatland habitats can be found, and most solids are



carbon-rich solids with some areas of deep peat. In Class 5 peat, soil information takes precedence over vegetation data, and no peatland habitat is recorded. This may also include areas of bare soil and soils are carbon-rich and deep peat.

- 10.2.8 The 1:50,000 BGS Bedrock Geology Map indicates that the solid geology underlying the majority of the site comprises semipelite from the Cliff Hills Phyllitic Formation. On the east fringes of the site, the underlying bedrock is shear-bounded metamorphic rock slices forming tectonic melange of the Quarff Succession and Melange. At the north-western boundary of the site, a small section of the bedrock is Quartzite of the Dales Voe Grit Member (Figure 10.4). All of these are recorded as low productivity aquifers. The aquifers in the semipelite and the tectonic melange are recorded as having small amounts of groundwater in the near-surface weathered zone and secondary fractures. The aquifer in the quartzite is recorded as having small yields where fractured near-surface and from springs locally (Figure 10.5).
- 10.2.9 A Geological Conservation Review (GCR) site known as Easter Rova Head is located approximately 900 m east of the site, which is also a SSSI (Figure 10.6). The East Mainland Coast, Shetland SPA is located in the sea around the peninsula.
- 10.2.10 A review of SEPA's interactive environment mapping¹ indicates that the site is within a ground "drinking water protection zone" but is not within a surface "drinking water protection zone". The site is underlain by the Shetland water body which is classified as "good" in terms of groundwater quality.
- 10.2.11 A review of the SEPA online Flood Map² indicates there is no risk of fluvial flooding and surface water flooding at the site. A pocket of low-risk surface flooding is indicated immediately out with the site boundary; however, this is characterised by the local terrain depression at the Loch of Kebister. No other areas of surface flooding are indicated. Coastal flooding is indicated out with the site around the edge of the peninsula, a minimum 70 m from the site boundary. No groundwater flooding at or around the site is indicated however the site is shown to be a Potentially Vulnerable Area. In response to a Freedom of Information request in September 2020, SIC provided details of a flooding incident at a landfill site in August 2005 at North Gremista Industrial Estate located east of the site at Wester Rova Head approximately 660 m from the site.
- 10.2.12 Based on the above SEPA online Flood Map and information provided by SIC, significant flood risk is considered unlikely to exhibit any material flood risk to the proposed development.
- 10.2.13 Based on information from the 2011 ES and the absence of residential properties in the close vicinity, it is considered that there are unlikely to be any Private Water Supplies (PWS) within influencing distance. In response to the Freedom of Information request, SIC confirmed that there are no PWS within 2 km of the site centre and 1.2 km of the site boundary. We note that there was a record of process water being abstracted at the recycling site, but this appears to be surface water, unlikely to be affected by the development and not used for drinking water purposes.
- 10.2.14 In response to the Freedom of Information request in September 2020, SEPA provided the details on all CAR authorisations within 2 km from the site centre point. One location of abstraction was identified in this search area. The abstraction of water from a spring by SIC Energy Recovery Plant for process water is located approximately 680 m east of the site. However, due to the thick cover of peat on the site and the waste and recycling site located between the site and the abstraction point, the abstraction point is considered unlikely to be affected by the Proposed Development.

¹ <https://www.sepa.org.uk/data-visualisation/water-environment-hub/>

² <https://map.sepa.org.uk/floodmap/map.htm>



10.3 Guidance and Legislation

10.3.1 The following legislation and guidance will be taken into consideration when developing assessment methodologies and mitigation measures:

- EC Water Framework Directive (2000/60/EC);
- SPP, Scottish Executive, June 2014;
- Water Environment and Water Services (Scotland) Act 2003;
- Water Environment (Controlled Activities) Regulations 2011;
- River Basin Management Plan for the Scotland River Basin District: 2015-2027;
- The SuDS Manual C753, CIRIA, 2015;
- SIC Local Development Plan 2014;
- SIC Local Flood Risk Management Plan 2016;
- Good practice during wind farm construction, 4th edition (Scottish Renewables, SNH, SEPA, Forestry Commission Scotland and Historic Scotland, 2019);
- SEPA Guidance for Pollution Prevention (GPP) 1: A general guide to preventing pollution (2020);
- SEPA GPP 5: Works and maintenance in or near water (2018);
- SEPA Policy 19: Groundwater Protection Policy for Scotland (Version 3, 2009);
- SEPA Guidance Note 4: Planning advice on wind farm developments, LUPS-GU4 (SEPA, 2017);
- SEPA Guidance Note 31: Guidance on assessing the impacts of development proposals on groundwater abstractions and Groundwater Dependent Terrestrial Ecosystems (SEPA, 2017); and
- Developments on Peatland: Guidance on the assessment of peat volumes, reuse of excavated peat and the minimisation of waste (Scottish Renewables and SEPA, 2012).

10.4 Proposed Scope of Assessment

Proposed Study Area

10.4.1 The study area will primarily be based upon the land within the red line boundary, within a wider study area of 500 m for hydrological, geological and hydrogeological receptors near the site.

10.4.2 A PWS search has been carried out by SIC within 2 km from the centre point of the site as part of the Freedom of Information request, which gives a minimum search distance of 1.2 km from the site boundary. This search area has also been used for details on CAR licenses and historic flooding. This distance is considered appropriate based on the local terrain, environmental constraints and proximity to the coastline.

Assessment Methodology

10.4.3 A desk-based assessment will be carried out in order to establish the baseline hydrological, hydrogeological, geological and peat conditions beneath the Site. The desk-based review of baseline information will comprise:

- The determination of site hydrogeology, geology and peat from maps published by the BGS, and any previous site investigation reports which may be available;
- A review of existing sources of data relating to the water regime, including SEPA water quality and flood risk, discharge consents, abstraction licenses and identification of other water uses;
- A review of NatureScot's Carbon and Peatland 2016 map;



- A review of the development proposal and reports from other technical studies being undertaken, including ecological surveys which may identify areas of ground water dependent terrestrial ecosystems (GWDTE); and
- A review of the 2011 ES for the consented wind farm.

10.4.4 On-going consultation will be carried out with NatureScot, SEPA and SIC.

10.4.5 Site survey work will be undertaken in two stages. A Stage 1 peat survey has already been carried out within the site boundary across areas of the site being considered for development. A peat depth contour of the development area has been generated to illustrate the distribution and depth of peat with the potential for significant constraints in siting turbines and infrastructure. The findings of the Stage 1 peat survey will be considered for design iterations.

10.4.6 Survey work also included a hydrological survey of watercourses and water bodies on the site which may be impacted by the development, including proposed locations where watercourses will require to be crossed. Drainage flow paths and potential localised food risk sources were also assessed as well as the scope for siting and implementing SuDS.

10.4.7 Further consultation will be undertaken with SEPA to determine whether a Stage 2 peat survey may be required dependent on survey data to date. If required, this would comprise detailed targeting of proposed turbine, track and infrastructure locations following a design chill and would likely include peat cores and/or auger samples at turbine locations in order to better characterise the nature of the peat across its full depth and to carry out laboratory testing of carbon content, moisture content and bulk density.

10.4.8 A review of potential GWDTE identified will be carried out and assessed for inclusion within the EIA chapter.

10.4.9 The assessment will also provide a comparative summary of the change in impacts from the consented 2011 ES against the Proposed Development and indicate whether the assessed effect has changed.

Receptors and Impacts Scoped Out of Assessment

10.4.10 Due to significant flood risk being very unlikely to affect the development, it is considered that the requirement for a formal flood risk assessment can be scoped out.

10.4.11 Based on information from the 2011 ES, the absence of residential properties in the close vicinity and no PWS being identified within a 2 km from the site centre, we assume that the requirement for a formal PWS Assessment can be scoped out.

10.5 Potential Mitigation

10.5.1 Impacts on identified hydrological, hydrogeological and geological receptors will be avoided or minimised where possible through the careful design of the Proposed Development. Specific mitigation to be embedded into the design is likely to include:

- Maintaining a buffer of at least 50 m around any significant surface watercourses and water bodies unless unavoidable. Significant surface watercourses and waterbodies are identified on OS 1:50,000 mapping.
- Avoiding siting infrastructure in areas of elevated flood risk. However, as identified previously, no areas of material flood risk have been identified at the site.
- Designing watercourse crossing in accordance with the relevant guidance and SEPA CAR regulations.
- Incorporation of suitable drainage design measures to ensure that discharge rates and water quality is controlled to appropriate standards prior to discharge to the water environment. This



will ensure that the receiving water environment is not adversely affected by drainage and runoff from the site.

- Agreement and implementation of a CEMP to control potentially polluting activities to prevent adverse impact to downstream receptors.
- The peat depth probing survey will inform the design and layout of the Proposed Development. Where possible, the siting of turbines, tracks and other associated infrastructure, deep peat will be avoided. Furthermore, the peat depth contour has been considered alongside a slope map, to provide a high-level view on potential peat slide risks, aiming to site turbines in locations not likely to be susceptible to elevated risk. It is noted the presence of relatively deep peat is widespread across the site, so it is unavoidable that some of these areas may be affected by the development.
- Depending on the confirmed depth and nature of peat at the final turbine and infrastructure locations, a Peat Stability Risk Assessment (PSRA) will be carried out and an outline Peat Management Plan (PMP) provided.
- A Carbon Balance Calculation will be considered depending on the peat depths at the locations of infrastructure at the “design chill”. The calculation considers the potential carbon savings from renewable wind energy and losses associated with the construction of the wind farm, the loss of peatland and losses/savings associated with the carbon fixing potential of carbon stored in peatland.

10.6 Potential Impacts

Construction Impacts and Effects

10.6.1 Impacts on hydrological, hydrogeological and geological receptors at the construction phase of the Proposed Development is likely to include:

- Pollution, high levels of suspended solids and turbidity in downstream watercourses caused by sedimentation from excavated/ stockpile material. Pollution of surface water and groundwater through the operation of machinery (e.g. spillage of oils, fuels etc).
- Alteration of natural drainage patterns, changes in runoff rates and volumes due to increased areas of temporary hardstanding.
- Localised flooding and erosion caused by impediments to flow.
- Construction in peat areas may cause overloading and compaction of peat, increasing the risk of instability or collapse of the internal peat structure with potential effects on the hydrological regime of relatively large areas.
- Active or passive dewatering of peat deposits during construction may cause a degeneration in the peat structure by decreasing its water content, making it more susceptible to erosion.
- Excavation or disturbance of peat may also lead to disposal and have implications in terms of the overall carbon balance of the development.
- Erosion of peat can be the result of stripping of vegetation, excavations, ground disturbance, installation of drainage ditches and construction of access tracks.
- Excavations of superficial deposits, i.e. peat, is required from the construction of turbine foundations. Infrastructure compounds and access tracks.
- The abstraction of water from the water environment for onsite welfare facilities, construction water usage etc.
- Discharge of treated organic effluent from on-site welfare facilities into the water environment.



Operational Impacts and Effects

- 10.6.2 Impacts on hydrological, hydrogeological and geological receptors at the operational phase of the Proposed Development is likely to include:
- Pollution of surface water and groundwater as a result of maintenance activities associated with the operation of the site.
 - Alteration of natural drainage patterns, changes in runoff rates and volumes due to increased areas of permanent hardstanding.
- 10.6.3 No potential effects are expected on either superficial or solid geology as a consequence of the operational activities of the Proposed Development.
- 10.6.4 Subject to appropriate mitigation during construction, no additional effects on peat reserves are identified during the operation of the Proposed Development.

10.7 Scoping Questions to Consultees

- 10.7.1 As part of the scoping exercise, the following questions are proposed:
- Do consultees agree with the proposed scope of the geology, hydrology, soils and flood risk assessment?
 - Are consultees aware of any other private water supplies or surface/groundwater abstractions within the study area?
 - Do consultees agree that a flood risk assessment is not required for the site?
 - Are there any developments or infrastructure schemes which should be taken into account when considering potential cumulative impacts?

11. Telecommunications, Aviation and Radar

11.1 Introduction

- 11.1.1 This section considers potential issues associated with telecommunications, aviation and radar as a result of the Proposed Development during the operation phase.

11.2 Baseline Description

Aviation

- 11.2.1 Turbines have the potential to act as obstructions to low flying aircraft and can be detected by aviation radars, resulting in radar clutter for air traffic controllers and airport operators.
- 11.2.2 There are two aerodromes within the vicinity of the Proposed Development, including Tingwall Airport at 3.86 km distant and Sumburgh at 34.5 km distant. It is noted that Scatsta airport is currently closed and has no known plans to re-open.
- 11.2.3 The site is visible to the Air Defence radar at Saxa Vord and the Air Traffic Control (ATC) radar at Compass Head.
- 11.2.4 The site sits within a low priority Ministry of Defence (MoD) low fly zone. Therefore it is anticipated that infrared lighting may be required.



Telecommunications

- 11.2.5 During operation, wind turbines can potentially cause interference to telecommunication links through reflection and shadowing to electromagnetically propagated signals, including terrestrial fixed microwave links managed by telecommunication operators.
- 11.2.6 Interrogation of Spectrum Licensing's online database of fixed links³ indicates there are no links crossing the site. However, there are links within 1 km of the Site.
- 11.2.7 The 2011 ES identified two links within the vicinity of the site, operated by BT and T-Mobile. Consultation with the operators confirmed that the consented scheme was not anticipated to impact on these identified assets.

11.3 Guidance and Legislation

- 11.3.1 The following legislation and guidance will be taken into consideration when developing assessment methodologies and mitigation measures:
- Shetland Local Development Plan (SIC, 2014);
 - Shetland Local Development Plan. Supplementary Guidance – Onshore Wind Energy (SIC 2014);
 - Planning Advice Note: PAN 62 Radio Telecommunications (2001); and
 - Tall structures and their impact on broadcast and other wireless services (Ofcom, 2009).

11.4 Proposed Scope of Assessment

Aviation

- 11.4.1 Potential impacts will be assessed through consultation with NATS, MoD, Tingwall Airport, and other stakeholders as appropriate, following on from the previous consultation undertaken in 2011 as part of the previous consent.
- 11.4.2 The potential impacts on military and commercial aviation would be understood through a detailed consultation as part of the Scoping process and continued throughout the EIA process if required.

Telecommunications

- 11.4.3 Any potential effects on communication links will be sought through formal consultation with all relevant link operators. Where possible and applicable, the turbines will be designed to take into account the minimum separation distance from the identified communication link(s). An assessment will be made as to the significance of potential operational effects and where appropriate, suitable mitigation measures will be discussed.

Receptors and Impacts Scoped Out of Assessment

- 11.4.4 Potential impacts from aviation and telecommunications are only expected to occur during operation, and no impacts are anticipated during construction or decommissioning. It is therefore proposed to scope out construction and decommissioning impacts from further assessment.
- 11.4.5 As the proposed turbines are under 150 m, visible aviation lighting will not be required, and it is therefore anticipated that assessment of aviation lighting can be scoped out of further assessment.

³ <https://www.ofcom.org.uk/spectrum/information/spectrum-information-system-sis/spectrum-information-portal>



11.5 Potential Impacts

11.5.1 Potential impacts during the operational phase of the Proposed Development may include the following:

- Obstruction to low flying aircraft;
- Interference to aviation radars including air traffic controllers and airport operators; and
- Interference to telecommunication links.

11.6 Potential Mitigation

11.6.1 Should they be required; mitigation measures will be agreed through direct dialogue between the Applicant and relevant stakeholders.

11.7 Scoping Questions to Consultees

11.7.1 Do consultees agree the proposed scope of the assessment is appropriate?

12. Other Issues

12.1 Shadow Flicker

12.1.1 Shadow flicker can occur when the blades of a wind turbine cover the sun for brief moments as they rotate. For an observer viewing this phenomenon through a narrow opening (such as a window from within the affected area) it can create a rapid change in luminance, appearing as if the light is being 'flicked' on and off each time a blade passes in front of the sun.

12.1.2 The affected area is constrained in size and shape by astronomic and geometric parameters, such as the trajectory of the sun and the position and dimensions of the wind turbine. For a fixed observer, the occurrence of shadow flicker from a given wind turbine is generally limited to certain parts of the year and certain times of the affected days. It is possible to predict when, where and for how long shadow flicker could theoretically occur using commercially available computer programs.

12.1.3 There are at present no formal guidelines available on what exposure would be acceptable in relation to shadow flicker. There is no standard for the assessment of shadow flicker. The advice sheet from Scottish Government, Onshore Wind Turbines, a web-based guide (Scottish Government, 2014) sets out the potential geographic area which may fall under assessment: "*Where this (shadow flicker) could be a problem, Applicants should provide calculations to quantify effect. In most cases, however, where separation is provided between wind turbines and nearby dwellings (as a general rule ten rotor diameters), 'shadow flicker' should not be a problem.*"

12.1.4 Published research by the Department of Energy and Climate Change (DECC), Update of UK Shadow Flicker Evidence Base (DECC, un-dated), evaluates the current international understanding of shadow flicker and confirms an acceptable study area for assessment is ten rotor diameters from each turbine and within 130 degrees either side of north.

12.1.5 The maximum rotor diameter of the proposed turbines would not exceed 136 m, so the area where shadow flicker could be a problem extends to a maximum of 1.36 km.

12.1.6 With there being no residential properties within 1.36 km, it is proposed that shadow flicker is scoped out of the EIA. This matches the conclusion of the 2011 assessment for the previous consent.



12.2 Socio-economic, Recreation and Tourism

- 12.2.1 The 2011 ES identified no adverse effects on tourism or recreation from the consented scheme. It is considered that the Proposed Development will have similar negligible impacts.
- 12.2.2 The socio-economic, recreation and tourism benefits of the Proposed Development will be addressed in the accompanying Planning Statement, with any potential impacts assessed where appropriate within the various technical chapters of the EIA (e.g. LVIA and Archaeology & Cultural Heritage).
- 12.2.3 It is therefore considered that socio-economic, recreation and tourism does not warrant its own chapter within the EIA Report and can be scoped out of detailed assessment.

12.3 Television

- 12.3.1 The closest television transmitters are the Bressay and Scalloway transmitters. The Bressay Transmitter is located approximately 7 km south-east of the site, and the Scalloway Transmitter is located approximately 7.7 km south-west of the site. These transmitters have switched to digital transmission only. Currently, there is no widely accepted method of determining the potential effects of wind turbines on digital television reception. However, digital television signals are better at coping with signal reflections and do not suffer from the 'ghosting' effect that may have occurred with the now obsolete analogue signals.
- 12.3.2 To date, there are very few cases of wind turbine interference with digital television reception post-digital switchover. Given the strength of the digital signal in the area and the inherently resilient nature of digital television reception, there is considered to be a low risk of any interference from a wind energy development at this location on domestic television reception.
- 12.3.3 Due to the low risk of interference with television reception, the requirement to address any reception issues once the Proposed Development is operational could be conditioned in any consent granted. For the above reasons, it is not proposed to carry out a detailed assessment of potential effects on television reception, and this topic, therefore, will be scoped out of the further assessment.

12.4 Forestry & Land Use

- 12.4.1 There is no tree coverage on the Site; consequently, no tree felling will be required.
- 12.4.2 The current land use of the Site is largely rough grazing by sheep which is unimpeded by the operational turbine. The Proposed Development will have a negligible impact on the existing land use as it will be largely unchanged.
- 12.4.3 It is therefore proposed that an assessment of forestry and land use is scoped out of the EIA.

12.5 Air Quality & Human Health

- 12.5.1 The air quality of the Site is expected to be good due to the rural location, with few pollution sources.
- 12.5.2 During the construction of the wind farm, the movement of vehicles and the on-site plant would generate exhaust emissions. Given the short-term nature of the construction period and the limited area to be developed, effects on air quality are likely to be negligible.
- 12.5.3 Construction activities have the potential to generate dust during dry spells, which may adversely affect local air quality. Given the scale and nature of construction activities and given the distance between construction areas and the nearest residential properties, it is considered that dust from construction is unlikely to cause a nuisance.



- 12.5.4 An operational wind farm produces no notable atmospheric emissions. The operation of the wind farm would therefore have no discernible adverse effects on local or national air quality.
- 12.5.5 Relevant mitigation measures for air quality and pollution control will be captured within the site-specific CEMP.
- 12.5.6 The assessment of potential human health effects will be undertaken in the context of residential amenity (i.e. visual impact, and noise where scoped into the EIA).
- 12.5.7 It is therefore proposed that an assessment of air quality & human health is scoped out of the EIA.

12.6 Risk of Major Accidents and/or Disaster

- 12.6.1 Given the nature of the Proposed Development, and its remote location, the risk of a major accident or disaster is considered to be extremely low. The Principal Designer would need to ensure a Design Risk Assessment process is followed during the design phase to ensure designers fully assess risks and mitigate to a level deemed as low as reasonably practicable during the design stage as part of the requirements of the Construction (Design and Management) Regulations (2015).
- 12.6.2 During the operational phase of the Proposed Development, routine maintenance inspections would be completed in order to ensure the safe and compliant operation of all built infrastructure.
- 12.6.3 It is therefore proposed that an assessment of the risk of major accidents and/or disasters is scoped out of the EIA.

12.7 Scoping Questions to Consultees

- 12.7.1 Do you agree that it is appropriate to scope out the following topics from the EIA assessments?
 - (1) Shadow flicker;
 - (2) Socio-economic, recreation and tourism;
 - (3) Air quality and human health;
 - (4) Television reception;
 - (5) Forestry and land use; and
 - (6) Risks of major accidents and/or disasters.



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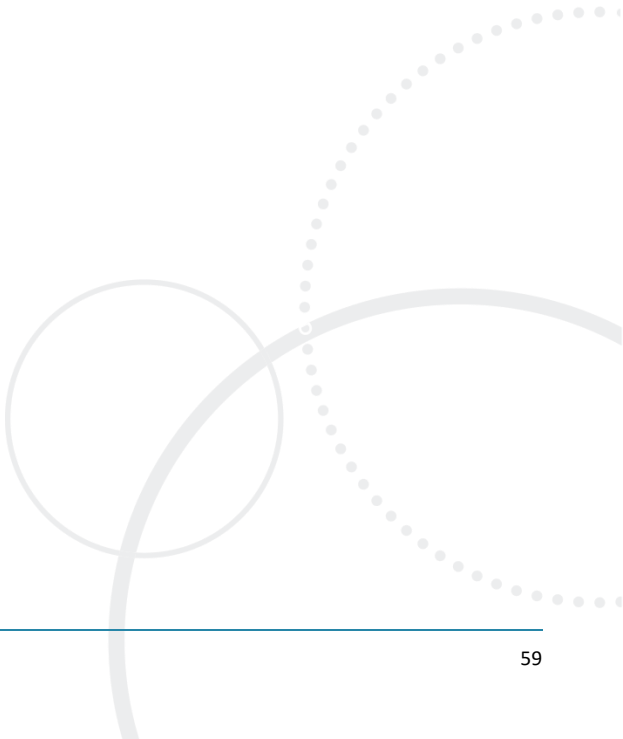
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Appendix 7.1: Site Gazetteer



Appendix 7.1: Site Gazetteer

| | |
|---------------------|--|
| Site Number | 1 |
| Site Name | Kebister |
| Type of Site | Cairn (Prehistoric)(Possible) |
| NRHE Number | HU44NE 23 |
| Status | Non-Designated |
| Easting | 446309 |
| Northing | 1145181 |
| Description | <p>A possible cairn is located on the summit of a hill at the southern end of the area. The feature is defined by a low mound, some 12m in diameter and 0.2m high with a dished interior. The edge of the mound is clearly defined to the east, north and west but is less clear to the south. The top of the mound has hardly any peat cover while the area to the north is covered by thick peat deposits. At AP 27 less than 10m to the north of the feature the peat thickness was 1.68m. This may indicate that the feature is partly sub-merged in peat and that it was originally much more prominent than it is now.</p> |

| | |
|---------------------|--|
| Site Number | 2 |
| Site Name | Kebister |
| Type of Site | TITHE BARN, BURNT MOUND, CHAPEL, GRAVE, SETTLEMENT, DYKE, TURF HOUSE, CIST |
| NRHE Number | HU44NE 12 |
| Status | Non Designated |
| Easting | 445650 |
| Northing | 1145160 |
| Description | <p>The area was surveyed and excavated in advance of an oil rig supply base with the excavations revealing a large teind barn dating from the early 16th C. A number of archaeological features were surveyed including burnt mounds, turf walled structures, cist</p> <p>A group of four, small turf-walled structures (Structures 20-23 in the published report) recorded during the Kebister survey on the summit of a grassy knoll. Structures 20 and 22 are sub-rectangular and traces of an entrance were noted at the SW corner of Structure 20. Structures 21 and 23 are sub-circular and are possibly the quarry sites for the construction of Structures 20 and 22. On the basis of their exposed location, small size and position relative to the sea, Structures 20-23 are tentatively interpreted as skeos (roughly built huts with plenty of spaces to let the wind through), in this case small fish-drying huts (Owen and Lowe 1999).</p> |

| | |
|---------------------|---|
| Site Number | 3 |
| Site Name | Muckle Ayre |
| Type of Site | Building (Period Unassigned) |
| NRHE Number | HU44SW 63 |
| Status | Non Designated |
| Easting | 444760 |
| Northing | 1144540 |
| Description | <p>One unroofed building is depicted on the 1st edition of the OS 6-inch map (Orkney & Shetland</p> |

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(Shetland) 1880, sheet lii), but it is not shown on the current edition of the OS 1:10000 map (1991).

| | |
|---------------------|--|
| Site Number | 4 |
| Site Name | Burn Of Tagdale |
| Type of Site | Building (Period Unassigned) |
| NRHE Number | HU44SW 63 |
| Status | Non Designated |
| Easting | 444950 |
| Northing | 1144630 |
| Description | One unroofed building is depicted on the 1st edition of the OS 6-inch map (Orkney & Shetland (Shetland) 1880, sheet lii), but it is not shown on the current edition of the OS 1:10000 map (1991). |

| | |
|---------------------|--|
| Site Number | 5 |
| Site Name | Kebister |
| Type of Site | Enclosure(S) (Period Unassigned), Hut Circle (Prehistoric)(Possible) |
| NRHE Number | HU44NE 16 |
| Status | Non Designated |
| Easting | 445580 |
| Northing | 1145130 |
| Description | Structure and two possibly associated enclosures are located at approximately 30m OD, near the S edge of the Kebister survey area, outwith the March Dyke (NO44NE 11.01), on rugged moorland immediately W of an area of extensive peat-cutting. The structure (Structure 24 in the published report) comprises a continuous heather-covered stoney-bank, 1m wide and 0.30m high, and is roughly circular. It underlies some 0.25-0.35m of peat, and is tentatively interpreted as a prehistoric building, conceivably a hut-circle. The two enclosures (Enclosures 8 and 9 in the published report) are located to its N and are represented by curvilinear stone banks, overlain by some 0.50m of peat (Owen and Lowe 1999). |

| | |
|---------------------|---|
| Site Number | 6 |
| Site Name | Kebister |
| Type of Site | Clearance Cairn(S), Field System, Rig And Furrow (Medieval), Structure(S) |
| NRHE Number | HU44NE 10 |
| Status | Non Designated |
| Easting | 445850 |
| Northing | 1145500 |
| Description | Part of the Kebister Township, see HU44NE 11.00. There are intricate field systems, including sub-peat dykes, over a wide area around Kebister |

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settlement (HU44NE 5, at HU 457 455) (Owen and Lowe 1987).

Six distinct groups of cultivation rigs were recorded, all within the area enclosed by the March Dyke (HU44NE 11.01) and likely to be post-medieval in date. The longest are more than 150m in length. The rigs vary in width from 5-10m but are mostly nearer 5m. Cultivation remains are clearly contained within a field (Enclosure 7 in the published report) (see HU44NE 11). 17 field clearance cairns were recorded, most of them on the coastal plain below 25m OD.

33 dykes of various types and lengths demonstrate a complex history of land management. The dykes served a variety of functions as field-edges, field boundaries and perhaps other enclosure boundaries. Historical and radiocarbon dating indicates that major dykes were constructed at least in the medieval, late medieval and post-medieval periods.

Three rectangular structures (Structures 13-15 in the published report) lie upslope of the cultivation remains, close to the March Dyke, are interpreted as medieval turf-walled plantie crub (upslope enclosures in which crops such as cabbage or kail were sown in late summer. (Owen and Lowe 1999).

Owen and Lowe, O and C. (1999) Kebister: the four-thousand-year-old story of one Shetland township, in Ritchie, A, Society of Antiquaries of Scotland monograph series No 14. Edinburgh

| | |
|---------------------|--|
| Site Number | 7 |
| Site Name | Kebister |
| Type of Site | Plough Marks (Period Unassigned), Settlement (Period Unassigned) |
| NRHE Number | HU44NE 5 |
| Status | Non Designated |
| Easting | 445720 |
| Northing | 1145520 |
| Description | Rescue excavations and survey work were undertaken in advance of the construction of an oil rig supply base. |

A low, circular mound immediately north of the post-medieval structure (HU44NE 5.02) marked the disturbed top levels of a prehistoric settlement. Finds over the mound surface included coarse pottery, stone and steatite artefacts of probable Norse origin. Beneath the farming disturbance was a damaged oval house site. The external wall was mostly ruinous but it was comparatively intact on the S side. No definite entrance was located. Orthostats punctuated the internal wall face within the building and formed alcoves, at least one of which was recessed into the wall itself. The interior had maximum dimensions of approximately 4m by 3m. Thick black occupation layers and a peat ash hearth filled the centre, and quantities of coarse pottery and stone implements were recovered. A complex series of drainage gullies, some contemporary with the building, ran below the walls and across the interior.

Another structure, comprised almost entirely of features in natural clay, underlay this one. The walls were marked by a double row of deep circular postholes, revealing a circular construction, about 8m in diameter. Many of the postholes were connected to each other by shallow slots and grooves. A substantial, rectangular, central hearth was the primary feature. Finds were scarce, but some coarse pot and stone implements were recovered. Other features were a large, oval water container and a rectangular cooking trough. Evidence of a sandstone knapping industry overlay the primary occupation features of the structure.

Remains of another building were discovered to the E. The building was in two phases and of a differing character from those above. The original eastern wall consisted of an internal face of coursed dry-stone walling, with a central entrance. Straight sections of similar walling adjoined either end of the curve and another entrance was located in the southern section of walling. Another curving wall ran parallel to the eastern end, enclosing a yard some 5m wide, where

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metal working took place. Two levels of rough paving filled the space between the two walls, forming an additional room or recess to the original building. The interior of the structure was filled with thick black occupation layers and a stone built hearth, rebuilt several times, was found. Much coarse pottery and many stone implements were recovered.

A massive stone built enclosure wall partially encircled the prehistoric settlement. Survey work in the areas revealed traces of multi-period agricultural activity, including at least three sub-peat dykes (Owen and C Lowe 1985).

Immediately N of the large house (HU44NE 5.02) a stone built, multi-cellular structure of at least two phases was located. It is likely to date from the late Iron Age on the basis of its pottery and structural type. The major linear cell had a paved floor overlying a clay floor with a hearth. The entrance was probably in the west. As with all areas at Kebister, it was rich in artefactual remains. To the E of this structure there was an area densely packed with complex negative features, pits, troughs, posthole, gullies and drains, often superimposed on each other, and may cutting a thick spread of burning. E of these features, part of a well built stone platform located in the section indicates that there may still be more structures to unearth at Kebister.

Prehistoric cultivation marks were found below all areas excavated in 1986 to the N of the large house. Three thermoluminescent survey dates for the earliest structure so far excavated have been obtained, and they all suggest that it is Neolithic (Owen and Lowe 1986)

Excavation of the prehistoric site was completed. A 4.60m stretch of walling containing a well-constructed semi-circular alcove is all that remains of a further stone structure. It pre-dates the oval house of stone and turf excavated in 1985. Substantial drains infilled with collapsed building masonry yielded a large quantity of stone artefacts including worked quartz implements, but no pottery. Analogy with the assemblage from the Scord of Brouster suggests a Neolithic date for this phase.

Ard marks were revealed across most of the site, overlying this phase. They criss-crossed each other diagonally, but the predominant trench was NW to SE. No field edges were discerned, but a collection of fine stone ard points was found distributed among the levelled stonework below. There the plough had broken on hitting underlying stone debris. This is believed to be the first discovery of ard points in direct association with ard marks.

An intensive systematic survey of the hillside above the site was undertaken in order to place the excavate site in its full local and environmental context. It revealed other areas of archaeological interest, notably a cluster of at least 6 burnt mounds about 290m E of the excavation (HU44NE 7), one large burnt mound with a central depression about 75m to the SE (HU44NE 8), another mound with protruding orthostats which is likely to represent a further prehistoric house site at 120m to the SW (HU44NE 9) and intricate field systems, including sub-peat dykes, over a wide area (HU44NE 10) (Owen and Lowe 1987).

| | |
|---------------------|--|
| Site Number | 8 |
| Site Name | Kebister |
| Type of Site | Burnt Mound(S) (Prehistoric) |
| NRHE Number | HU44NE 7 |
| Status | Non Designated |
| Easting | 445920 |
| Northing | 1145660 |
| Description | See also HU44NE 4. There is a cluster of at least six burnt mounds about 290m NE of Kebister settlement (HU44NE 5) (Owen and C Lowe 1987). |

The cluster of Burnt Mounds (1-6) lie at 15m OD, close to the shore and 20m SW of a dried up

Appendix 7.1: Site Gazetteer

water-course. Burnt Mounds 1 and 2 had previously been recorded as 'Viking Graves' by P Moar (records held in Lerwick Museum) and as burnt mounds by P Winham (see HU44NE 4). They are considerably more prominent than Burnt Mounds 3-6.

Burnt Mounds 1 and 2 lie just a few metres apart and are similar in size, shape and form. Both are oval with with one concave side facing away from each other. An arc of large angular stones 1.5m long may indicate a possible wall-line half-way up the concave side of Burnt Mound 1.

Burnt Mounds 3-6 vary in size and form. Burnt Mound 3 is small and circular; 4 and 5 are amorphous and lie adjacent to a natural break of slope; 6 comprises a linear spread of burnt stones delimited on the W by several earth-fast boulders. Test pits inserted into their surfaces confirmed that each was composed of small to medium, subangular to subrounded, burnt and fire-shattered stones in brown to black sandy loam. It is likely that the group as a whole represents one activity phase (Owen and Lowe 1999).

| | |
|---------------------|--|
| Site Number | 9 |
| Site Name | Kebister |
| Type of Site | Burnt Mound (Prehistoric) |
| NRHE Number | HU44NE 8 |
| Status | Non Designated |
| Easting | 445750 |
| Northing | 1145420 |
| Description | There is a large burnt mound with a central depression which may represent a cooking site about 75m SE of Kebister settlement (HU44NE 5) (Owen and Lowe 1987). |

The mound (Burnt Mound 7 in Owen and Lowe 1999) is located at about 20m OD, above and to the S of a dried up water-course, on the margin between the coastal belt of improved arable land and the higher pasture. It is kidney-shaped and appears to comprise three or four distinct elements. To the W is a sub-triangular mound with concave faces to the N and E. To the E is a mound with a concave face to the W. Between the two is an open area, possibly the site of the water-tank and hearth. To the S is a low, amorphous mound. Small test-pits excavated into the top of each mound revealed a dense concentration of small to medium, angular and subangular, burnt and fire-shattered stones in a matrix of dark grey silty clay. A large base sherd of coarse pottery of likely Bronze Age date was recovered (Owen and Lowe 1999).

| | |
|---------------------|---|
| Site Number | 10 |
| Site Name | Kebister |
| Type of Site | Mound (Period Unassigned), Settlement (Period Unassigned)(Possible) |
| NRHE Number | HU44NE 9 |
| Status | Non Designated |
| Easting | 445610 |
| Northing | 1145390 |
| Description | Situated 120m SW of Kebister settlement (HU44NE 5) is a mound with protruding orthostats, probably a prehistoric house. (Owen and Lowe 1987). |

The structure (Structure 19 in the published report) lies some 25m from the shore, in an

Appendix 7.1: Site Gazetteer

enclosed post-medieval field (see HU44NE 10). It is visible as a roughly circular, grass-covered mound, 10-12m across and standing 1m high on the W. Its upper surface is relatively level and defined to the S by three large orthostats, together with a low ridge. The E side has been damaged by later cultivation. Three test pits were excavated in its top. In Trench 1, a deposit of cultivated soil, 0.45m thick, overlay the archaeological deposits, including traces of burning. In Trench 2 a wall-face of roughly dressed stone slabs was exposed. No archaeological deposits were encountered on the E side of the mound (Trench 3). The structure is interpreted as a prehistoric house similar in form and size to the Iron Age oval stone house excavated in the main trench at HU44NE 5 (Owen and Lowe 1999).

| | |
|---------------------|--|
| Site Number | 11 |
| Site Name | Kebister |
| Type of Site | Head Dyke (Post Medieval), Township (Period Unassigned), Watermill |
| NRHE Number | HU44NE 11 |
| Status | Non Designated |
| Easting | 445670 |
| Northing | 1145350 |
| Description | See also HU44NE 5, HU44NE 10, HU44NE 14 |

Applies to ruins, situated 1/2 mile SW of Luggie's Knowe and 1 mile NW of Greenesta farmhouse. The property of Lady Nicholson, island of Fetlar. Name Book 1857

The crofting settlement comprised, in its final form, seven, conjoined, rectangular units built of drystone walling, all aligned NW-SE. The walls survive to 1.6m high in places and are generally c.1m wide. Internal floor areas range from 6.4 to 31.5 square metres. This settlement was abandoned about 1820. Associated features include a watermill (Structure 17 in the published report), a sheep-pen (Structure 16), a corn-drying kiln built over a teind barn (HU44NE 5.02) and four enclosures (Enclosures 4-7), one of which contained an area of rig (Cultivation Remains 6, see HU44NE 10).

No archaeological evidence of suspected Norse or early medieval occupation on the site was found.

The remains of a small horizontal water mill were recorded at the base of the steep slope below the settlement, in a meander of the Burn of Kebister. It was rectangular, aligned NW-SE with drystone walls and an entrance in the centre of the NE wall. The water-channel, 1.4m wide, was located at the NW end of the building. The mill race forms a channel approximately 10m long on the S side of the mill.

The settlement is known to its present neighbours, living across the voe, as 'Handigert' (Willy and Mary Anderson pers comm), though this name never appears in the documentary sources and all those who lived in the township between 1577 and 1817 gave their address as Kebister (Owen and Lowe 1999).

A township, comprising four unroofed buildings (see HU44NE 5 and HU44NE 14), one enclosure and a head-dyke is depicted on the 1st edition of the OS 6-inch map (Orkney and Shetland (Shetland) 1881, sheet liii). Six unroofed buildings and one enclosure are shown on the current edition of the OS 1:10000 map (1973). Information from RCAHMS (AKK) 20 March 2001.

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| | |
|---------------------|--|
| Site Name | Kebister, March Dyke |
| Type of Site | Head Dyke (Post Medieval) |
| NRHE Number | HU44NE 11.01 |
| Status | Non Designated |
| Easting | 446000 |
| Northing | 1145260 |
| Description | HU44NE 11.01 From 4555 4526 to 4613 4582, centred at 4600 4536 |

HU44NE 11.00 Township; Watermill

The March Dyke form the dividing line between the townland and the common grazing. Approximately 1100m in length, it encloses an area roughly 20ha. In places, a quarry ditch, 2.5m to 5m wide and up to 0.50m deep, occurs on its upslope side. Two gaps, interpreted as entrances, occur in its S circuit; a further gap was noted in its E circuit, near Structure 15. The dyke had been erected over an iron-stained, thin podzol profile which was not peat-covered. It consists of peat blocks, each about 0.20m by 0.30m, laid to form a bank some 1.2m wide and 0.45m high. Several displaced peat blocks were noted on the downslope side of the excavated section. The basal course of a stone wall, 0.90m wide, survived on top of the bank, constructed of large, locally derived, unworked stones (quartz, quartzite and sandstone) which would have formed a visible white boundary.

No dating evidence was recovered but the absence of underlying peat growth, the good preservation and its identification as a typical hill-dyke probably signify a post-medieval date. It is suggested that the final hill-dyke may have been constructed at the end of the 18th or beginning of the 19th century (Owen and Lowe 1999).

The head-dyke is depicted on the 1st edition of the OS 6-inch map (Orkney and Shetland (Shetland) 1881, sheet liii), but it is not shown on the current edition of the OS 1:10000 map (1973).Information from RCAHMS (AKK) 20 March 2001.

| | |
|---------------------|---|
| Site Number | 13 |
| Site Name | Kebister |
| Type of Site | Burial Ground (Period Unassigned), Chapel |
| NRHE Number | HU44NE 5.01 |
| Status | Non Designated |
| Easting | 445690 |
| Northing | 1145490 |
| Description | <p>Rescue excavations and survey work were undertaken in advance of the construction of an oil rig supply base. The interior of a substantial post-medieval structure of possible 16th century date was excavated. The house cut through the remains of earlier medieval, rectangular stone structures, contained within an enclosure wall. Midden material found outside and stratigraphically below the western entrance of the large house is likely to date from the Norse period. The house overlay a subrectangular wooden structure, aligned W to E, which may conceivably be the remains of an early Christian chapel. A piece of porfido verde antique, possibly part of a reliquary base, such as those known from St Ninian's Isle and Jarrow, was found nearby.</p> <p>A final season was undertaken. The remains of two wooden boxes set in trenches cut into natural clay were excavated within and below the level of the 16th century structure. The best preserved had planked sides, and a base and lid of pine. Although no bone survived, these are almost certainly coffins, and C14 determination are expected to indicate an early Christian date. Scant traces of a small rectangular structure aligned E to W, and located adjacent of the</p> |

Appendix 7.1: Site Gazetteer

coffins, have been interpreted as a chapel site (Owen and Lowe 1987).

| | |
|---------------------|--|
| Site Number | 14 |
| Site Name | Kebister |
| Type of Site | Corn Drying Kiln (Period Unassigned), Tithe Barn (16th Century) |
| NRHE Number | HU44NE 5.02 |
| Status | Non Designated |
| Easting | 445700 |
| Northing | 1145500 |
| Description | <p>Kebister, Shetland, portable cross-incised pebble. Measurements: H 176mm, W 52mm, D 15mm Stone type: sandstone</p> <p>Present location: Shetland Museum, Lerwick</p> <p>Evidence for discovery: found during excavations in 1985-7 in a redeposited context adjacent to the sixteenth-century teind barn.</p> <p>Present condition: good.</p> |

One flat face of this pebble has been incised with a Latin cross with very small expanded terminals and a circle at the base of the shaft.

Date: seventh or eighth century.

Rescue excavations and survey work were undertaken in advance of the construction of an oil rig supply base. The interior of a substantial post-medieval structure of possible 16th century date was excavated. Well-built, of dry-stone construction with walls 1m thick, it was rectangular in shape, aligned E-W on a slope, and had maximum internal dimensions of 15m by 5.25m. There was only one entrance to the building, in the centre of the W wall and the interior was partitioned into three units. A complex drainage system was installed when the structure was built and subsequently improved. The clay floor in the eastern unit was partially re-laid, suggesting habitation of some duration. A possible hearth was located against the N wall. The large western unit almost certainly had a raised wooden floor, supported on a stone ledge protruding from the lower courses of the wall faces. Two corresponding post pads provided firm bases for timber posts to support the roof. The large quantity of tumbled building rubble in the central unit was used to form a floor surface for a 17th to 18th century two-phase corn-drying kiln complex. This may be associated with a later group of croft buildings located on the other side of the Burn of Kebister (HU44NE 11.00).

O Owen and C Lowe 1985.

The exterior of the substantial post-medieval structure was investigated, and is likely to have been a two-storeyed building. Above the door a richly decorated armorial panel of sandstone was built into the wall. The work is sophisticated, shows ecclesiastical influences, and is likely to date from the late 15th Century or early 16th Century on stylistic grounds. It bears the Latin inscription 'sine paulusper'. A small gold tag was dropped just outside the door.

The remains of later stone built sheds were found backed against the S wall of the large house, but these were in use after its abandonment. The house cut through the remains of earlier medieval, rectangular stone structures, contained within an enclosure wall. Midden material found outside and stratigraphically below the western entrance of the large house is likely to date from the Norse period. The house overlay a subrectangular wooden structure, aligned W to E, which may conceivably be the remains of an early Christian chapel (HU44NE 5.01).

O Owen and C Lowe 1986.

It has now been proved beyond reasonable doubt that the armorial stone found in 1986 was commissioned by Henry Phankouth, Archdeacon of Shetland 1501-29. The substantial rectangular stone building from which it came must be the 'manse of the archdeaconry' which

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Jerome Cheyne, the archdeacon in 1561, complained had been allowed to 'fall down'. This substantiates the archaeological interpretation of the structure as a little used high status residence which fell into disrepair at an early date. Excavation in 1987 showed that the central room of the abandoned building was rescued shortly afterwards to house a rectangular corn-drying kiln with a central bowl and a flue leading into it from the S. At the same time some secondary occupation occurred in the E room. This kiln was subsequently adapted, probably in the 18th century, by which time the ruins of the original building were uninhabitable.

An intensive systematic survey of the hillside above the site was undertaken in order to place the excavated site in its full local and environmental context (see HU44NE 10, HU44NE 11).

| | |
|---------------------|--|
| Site Number | 15 |
| Site Name | Kebister |
| Type of Site | Farmstead (Period Unassigned), Rig And Furrow (Medieval), Sheepfold (Period Unassigned) |
| NRHE Number | HU44NE 14 |
| Status | Non Designated |
| Easting | 446000 |
| Northing | 1145730 |
| Description | <p>A small farmstead was identified during the Kebister survey, at Doo's Cove at the N end of the area enclosed by the March Dyke (HU44NE 11.01). It comprises a possible post-medieval croft-house, a sheep-pen, a field-clearance cairn and cultivation remains. The croft-house (Structure 11 in the published report) is now largely obscured by the modern road embankment. Its side wall, some 11m long, survives and there are traces of a return wall at either end. The sheep-pen (Structure 10 in the published report) is located on a small headland immediately W of Doo's Cove and is represented only by a low grass-covered arc of stones. Both of these structures are represented on the 1:10,000 OS map (HU44NE) as small square buildings. The clearance cairn lies at the E end of the arc of stones belonging to the sheep-pen. The five broad rigs (Cultivation Remains in the published report) lie to the NE of the structures.</p> <p>O Owen and C Lowe 1999.</p> <p>This farmstead, part of Kebister township (See HU44NE 11.00), comprising one unroofed building is depicted on the 1st edition of the OS 6-inch map (Orkney and Shetland (Shetland) 1881, sheet liii). Two unroofed buildings are shown on the current edition of the OS 1:10000 map (1973).</p> <p>Information from RCAHMS (AKK) 20 March 2001.</p> |

| | |
|---------------------|---|
| Site Number | 16 |
| Site Name | Kebister |
| Type of Site | Cist (Period Unassigned), Cremation Pit(S) (Prehistoric) |
| NRHE Number | HU44NE 15 |
| Status | Non Designated |
| Easting | 445730 |
| Northing | 1145350 |
| Description | <p>A prominent, steep-sided, grassy knoll is situated SE of the main Kebister excavation site (HU44NE 5). It has a flattish top, made by a series of low amorphous mounds, 0.10-0.20m high, interspersed with rock outcrops. Trial excavations uncovered a small cist and two pits, all</p> |

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containing cremated human bone.(Owen and Lowe 1999).

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| Site Number | 17 |
| Site Name | Gremista |
| Type of Site | Natural Feature (Period Unknown) |
| NRHE Number | HU44SE 300 |
| Status | Non Designated |
| Easting | 446600 |
| Northing | 1144800 |
| Description | <p>A watching brief was carried out, 11–12 December 2012, during the excavation of 23 test pits at Gremista. No finds or features of archaeological significance were recorded; however, a thick deposit of peat (>3m in places) indicates the site has potential for palaeoenvironmental investigation.</p> <p>Barton, R. (2014) Tingwall, Gremista, Watching brief, Discovery Excav Scot, New, vol. 14, 2013. Cathedral Communications Limited, Wiltshire, England. Page(s): 175</p> |

| | |
|---------------------|---|
| Site Number | 18 |
| Site Name | Gremista |
| Type of Site | Horizontal Mill (Period Unassigned) |
| NRHE Number | HU44SE 64 |
| Status | Non Designated |
| Easting | 446240 |
| Northing | 1143250 |
| Description | <p>Mill (NAT)OS 6-inch map, Shetland, 1st ed. (1881), sheet liii. No trace of this mill, though the line of the lade can still be clearly seen. Visited by G Douglas, SIAS, 2 October 1984.</p> |

| | |
|---------------------|---|
| Site Number | 19 |
| Site Name | Gremista |
| Type of Site | Axehead (Stone) |
| NRHE Number | HU44SE 14 |
| Status | Non Designated |
| Easting | 446100 |
| Northing | 1143200 |
| Description | <p>'A celt of greyish porphyritic stone' 10 ins long and 3 ins across widest part, among a collection from the Museum at Lerwick purchased by the National Museum of Antiquities of Scotland (NMAS) in 1882, (Proc Soc Antiq Scot 1883), was found in 1854 at a depth of 6 ft., in cutting peats in the hill above Grimaster called Mount Bran, about two miles from Lerwick (Anderson 1886).</p> |

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Mount Bran is not known locally at, or near, the farm of Grimaster (HU 4616 4323). No further information could be obtained concerning this axe. Visited by OS (RD), 4 September 1964

Anderson, J. (1886a) Scotland in pagan times: the bronze and stone ages: the Rhind lectures in archaeology for 1882. Edinburgh. Page(s): 340

PSAS. (1883) Donations to and purchases for the Museum and Library, with exhibits', Proc Soc Antiq Scot, vol. 17, 1882-3. Page(s): 16 Fig.8

| | |
|---------------------|--|
| Site Number | 20 |
| Site Name | Gremista |
| Type of Site | Military Installation (20th Century) |
| NRHE Number | HU44SE 148 |
| Status | Non Designated |
| Easting | 445180 |
| Northing | 1143080 |
| Description | A series of 45 ordnance storage revetments along the A970 road W of Gremista are visible on RAF aerial photographs taken in 1946 (106G/Scot/UK 97: 3051 and 3052, 18 May 1946). Only one revetment is depicted on the current OS 1:10000 sheet, at HU 4518 4308. Information from RCAHMS (KM), 12 June 2002. |

| | |
|---------------------|--|
| Site Number | 21 |
| Site Name | Gremista |
| Type of Site | Event |
| NRHE Number | HU44SE 297 |
| Status | Non Designated |
| Easting | 445255 |
| Northing | 1142750 |
| Description | <p>A watching brief was undertaken 20–21 June 2012 during the construction of an access track for a wind turbine on a greenfield site to the S of the A970 and NW of Lerwick. This area of improved grazing, which is cut by numerous land drains and occasional natural gullies, was considered sensitive as a walkover survey by Headland Archaeology had indicated the presence of possible prehistoric cairns within 95–105m of the development area.</p> <p>The excavations for the access track recorded natural deposits sealed by subsoil deposits that showed evidence of significant modern disturbance. Any features or deposits of archaeological interest in these layers are likely to have been destroyed. The deposits of silty peat preserved within hollows and gullies appear to represent typical post-glacial peat formation (Barton 2013).</p> <p>Barton, R. (2013) Lerwick, North Hoo Field, Gremista, Watching brief, Discovery Excav Scot, New, vol. 13, 2012. Cathedral Communications Limited, Wiltshire, England. Page(s): 167</p> |

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| Site Number | 22 |
| Site Name | Dales Voe |
| Type of Site | Burnt Mounds, Ship Burial |
| NRHE Number | HU44NE 4 |
| Status | Non Designated |
| Easting | 445683 |
| Northing | 1145517 |
| Description | Two low turf-covered mounds cut by a channel. One is kidney shaped with a smaller mound to the NE. Likely to be the remains of burnt mounds although they have been identified as Viking graves. |

(1) Two turf-covered mounds cut by channel.(2) Burnt mounds. Two low turf-covered mounds, cut by channel. Previously recorded by P. Moar as Viking graves.(3) c.3' high, 18' x 28', recorded by P.Moar as Viking gravs.(4) Mounds possibly survive.

This site appears to be part of a group of six burnt mounds (HU44NE 7) recorded during detailed survey of the area as part of the Kebister project, 1985-87 (Owen and Lowe 1999).

| | |
|---------------------|---|
| Site Number | 23 |
| Site Name | Muckle Ayre |
| Type of Site | Circular feature |
| NRHE Number | |
| Status | Non Designated |
| Easting | 444636 |
| Northing | 1144236 |
| Description | A sub circular feature is visible on the lower slopes of the Banks of the Lees south west of Muckle Ayre. It is demarcated by an area of wetland grasses located on a raised subrectangular green platform. Recorded by AOC Archaeology Group (09/06/17). |

| | |
|---------------------|---|
| Site Number | 24 |
| Site Name | Loch of Kebister |
| Type of Site | Sluice |
| NRHE Number | |
| Status | Non Designated |
| Easting | 445557 |
| Northing | 1144652 |
| Description | A sluice is marked on the west side of the Loch of Kebister on Ordnance Survey mapping from 1881. It was not seen during a walkover survey by AOC Archaeology Group 09/06/17 in very poor visibility. |

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| Site Number | 25 |
| Site Name | Vatsland |
| Type of Site | Farmstead (Period Unassigned), Sheepfold (Period Unassigned) |
| NRHE Number | HU44NE 13 |
| Status | Non Designated |
| Easting | 446704 |
| Northing | 1145998 |
| Description | <p>Ruins on the east side of Kebister Ness. The property of Lady Nicholson, island of Fetlar.</p> <p>Name Book 1881.</p> <p>Vatsland was a small satellite settlement of Kebister (HU44NE 5; HU44NE 11). It probably originated as an animal enclosure belonging to Kebister and became inhabited in later medieval or (less likely) post-medieval times. Together, Kebister and Vatsland were the foci of a 'scattald' (a settlement district with exclusive pasture paying 'scat' to the crown).</p> <p>By the 16th century Kebister and Vatsland were part of the estates of an important Orkney ecclesiastic, the archdeacon of Shetland.</p> <p>O Owen and C Lowe 1999.</p> <p>A farmstead, comprising four unroofed buildings and one enclosure annotated 'Sheepfold' is depicted on the 1st edition of the OS 6-inch map (Orkney and Shetland (Shetland) 1881, sheet liii). One L-shaped enclosure is shown on the current edition of the OS 1:10000 map (1973).</p> <p>Information from RCAHMS (AKK) 20 March 2001.</p> |
| Site Number | 26 |
| Site Name | Kebister |
| Type of Site | Structure (Post Medieval)(Possible) |
| NRHE Number | HU44NE 22 |
| Status | Non Designated |
| Easting | 446174 |
| Northing | 1145638 |
| Description | <p>HU 46179 45646</p> <p>A rectangular structure is located 55m to the south of Site 1. It is visible as a rectangular sunken area aligned across the slope, north-east to south-west and measuring some 5.8m by 2.8m. The entrance is likely to be at the north-east end which is less well defined.</p> <p>HU 46189 45640</p> <p>A possible hut-platform is located less than 10m to the south-east of Site 2. It is visible as a slight curving scoop into the hillside with a corresponding bulge down slope forming an almost level sub-circular area some 3m by 4m.</p> <p>Information from OASIS ID: headland1-142396 (M Dalland) 2012</p> |

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| Site Number | 27 |
| Site Name | Kebister |
| Type of Site | Dyke |
| NRHE Number | HU44NE 21 |
| Status | Non Designated |
| Easting | 446184 |
| Northing | 1145710 |
| Description | A possible sub-peat dyke is located on the upper west-facing slopes of Kebister. It is defined by a slight ridge in the heather, aligned east-west. The feature can be traced over a distance of 26m. It is up to 0.3m high and 1.5m wide. Information from OASIS ID: headland1-142396 (M Dalland) 2012 |



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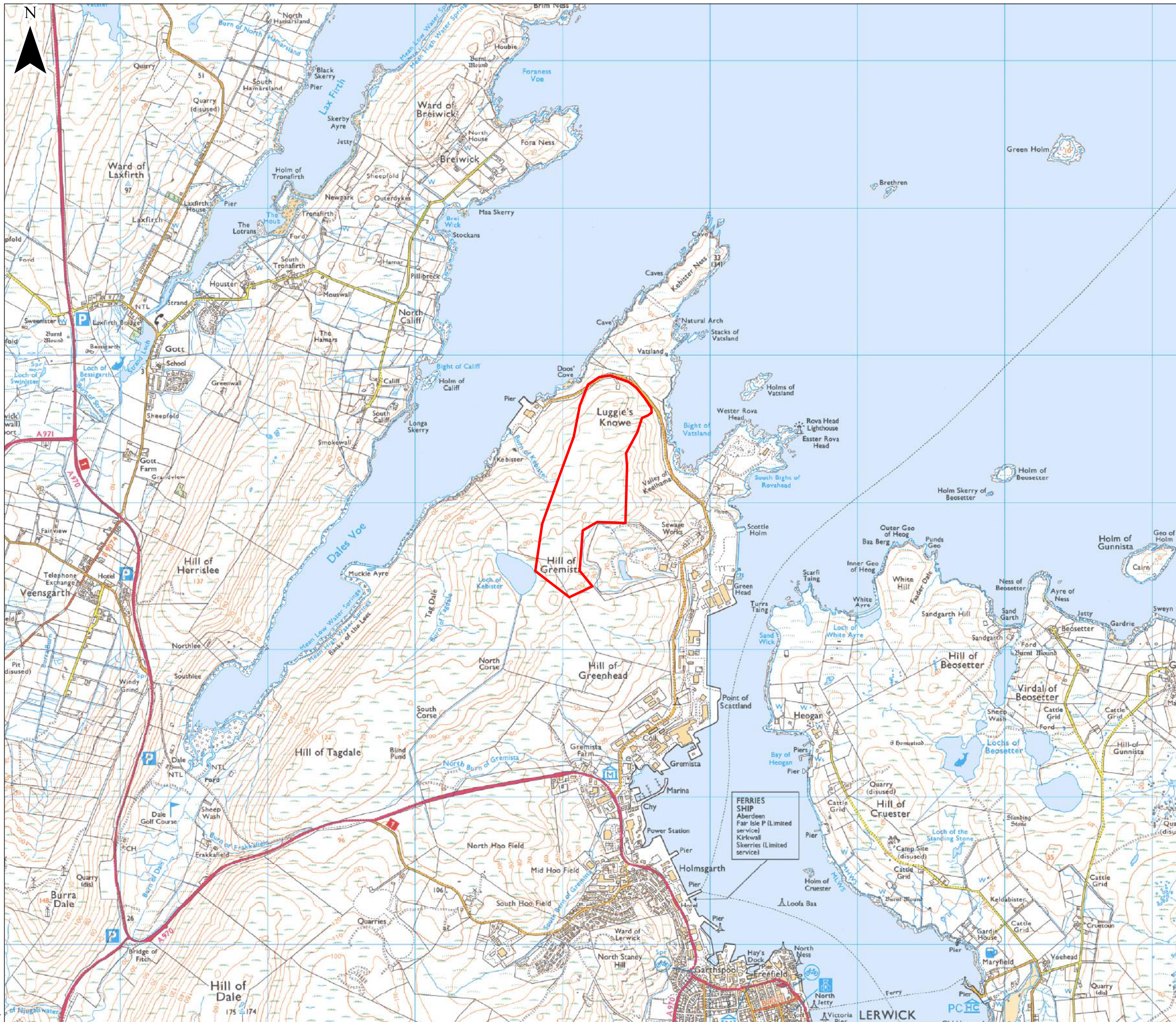
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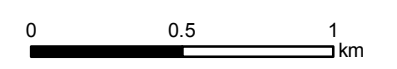
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KEY

Proposed Site Boundary



Scale 1:25,000 @ A3



Luggie Knowe Wind Energy Project
EIA Scoping Report

Figure 1.1
Site Location Plan

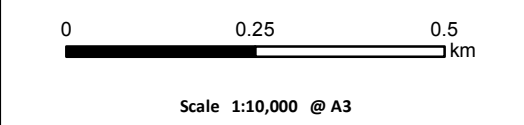
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| Date: 18/12/2020 | Drawn by: ST | Checked by: - | Version: v1 |
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Project Number: 3515



KEY

- Proposed Site Boundary
- Proposed Turbine
- Operational Turbine
- Operational Hardstanding
- Operational Access Track



Luggie Knowe Wind Energy Project
EIA Scoping Report

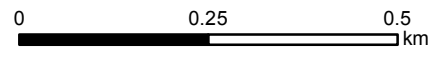
Figure 2.1
Proposed Site Layout

| | | | |
|------------------|--------------|---------------|-------------|
| Date: 06/01/2021 | Drawn by: ST | Checked by: - | Version: v1 |
|------------------|--------------|---------------|-------------|

Project Number: 3515



- KEY**
- Proposed Site Boundary
 - Previously Consented Site Boundary
 - Proposed Turbine
 - Operational Turbine
 - Previously Consented Turbine
 - Operational Hardstanding
 - Operational Access Track

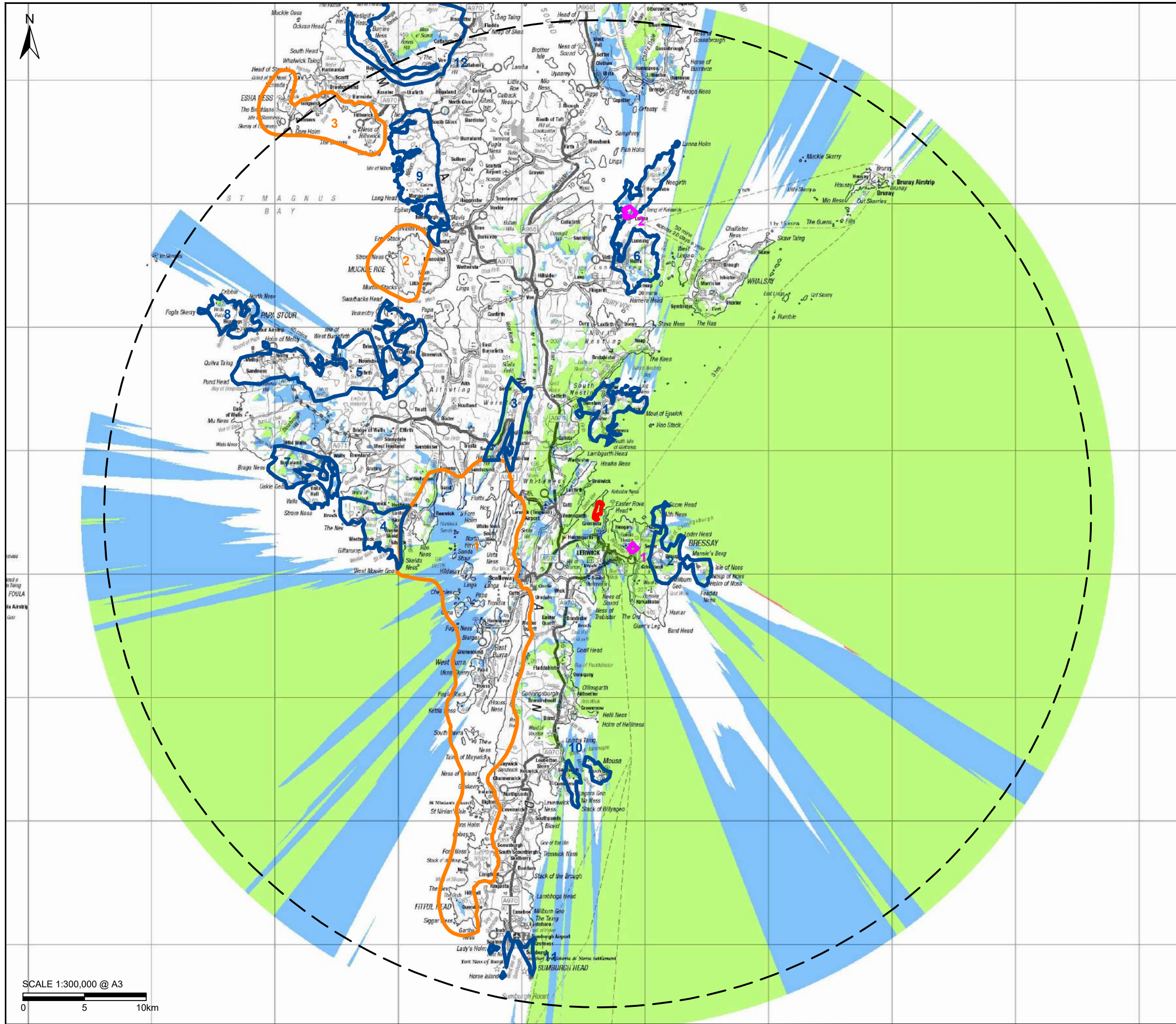


Scale 1:10,000 @ A3



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Figure 2.2
Comparison with
Previously Consented Development



Key:

- Site Boundary
- Landscape and Visual Impact Assessment Study Area
- National Scenic Area

1. South West Mainland
2. Muckle Roe
3. Eshaness

- Inventory Gardens and Designed Landscapes

1. Gardie House
2. Lunna House

- Local Landscape Areas

| | |
|---------------------------------|----------------------------|
| 1. Gletness and Skellister | 7. Walls and Vaila |
| 2. Aithness and Noss | 8. Papa Stour and Sandness |
| 3. Weisdale | 9. Nibon and Mangaster |
| 4. Culswick and Westerwick | 10. No Ness and Mousa |
| 5. Vementry and West Burrafirth | 11. Scatness and Sumburgh |
| 6. Lunna Ness and Lunning | 12. Ronas Hill |

Wind Farm Visibility

- Visibility of existing turbine
- Visibility of proposed turbines
- Combined visibility of existing and proposed turbines

NOTES: Calculated using Earth's curvature (radius 6360km) and atmospheric refraction coefficient of 0.075. Terrain data is derived from OS Terrain 50 gridded height data.

ZTV calculation does not take into account any surface features such as trees and buildings.

Blade tip height - 149.9m
 ZTV view height - 2m
 ZTV calculation resolution - 50m



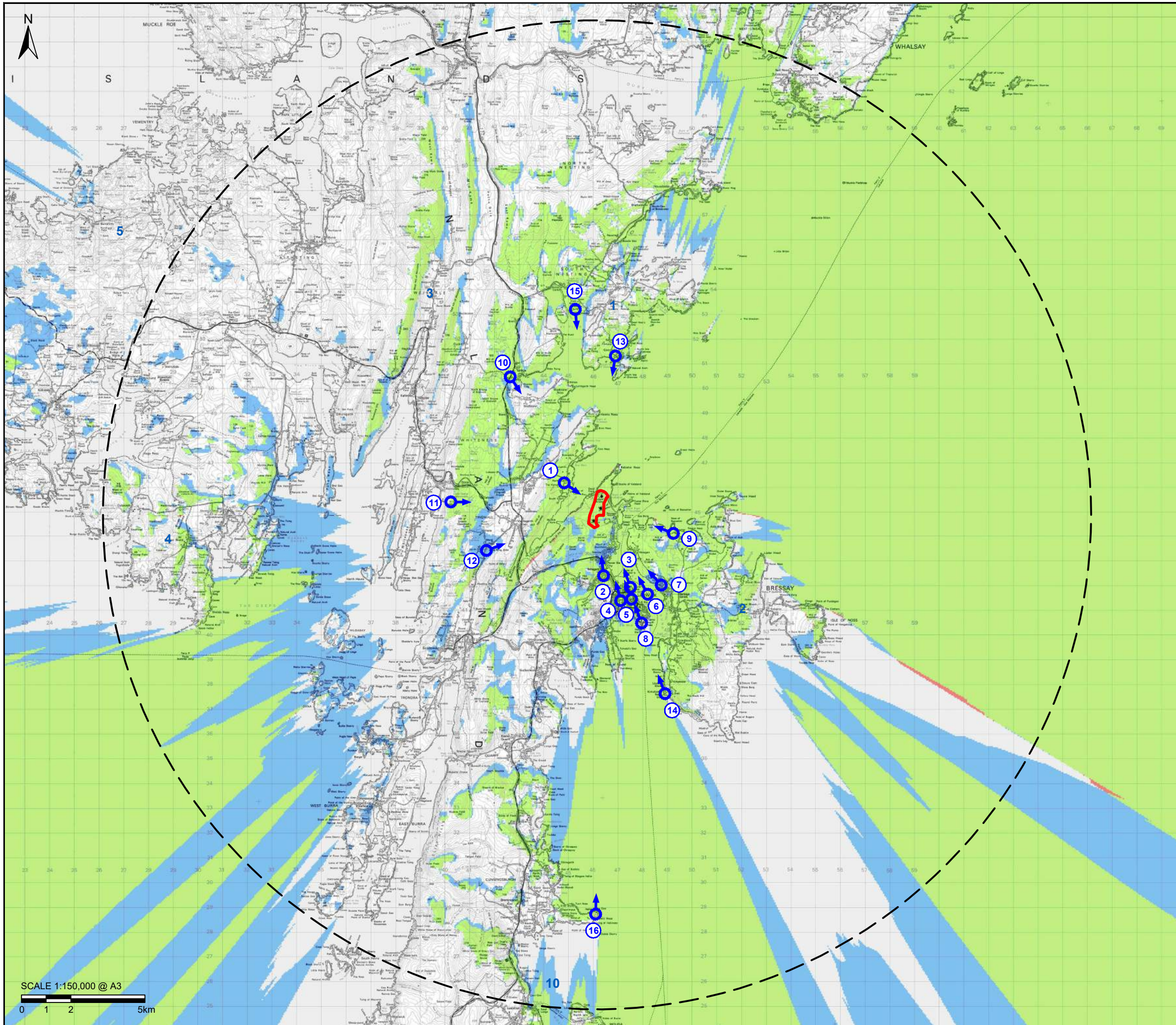
Luggies Knowe

Figure 4.1
Comparative ZTV overlaid with Landscape Designations


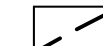

December 2020

SCALE 1:300,000 @ A3

0 5 10km






Key:

-  Site Boundary
-  20km radius from site centre
-  Viewpoint Locations

1. North Califf, Dales Voe
2. Gremista Brae, Holmsgarth, Lerwick
3. North Ness Business Park, Lerwick
4. Gilbertson Park, Lerwick
5. Fort Charlotte, Lerwick
6. Bressay Ferry
7. Gardie House, Bressay
8. The Knab, Lerwick
9. Beosetter, Bressay
10. Girsta / A970
11. Nesbister Hill
12. Loch of Tingwall
13. Gletness
14. Kirkabister Ness, Bressay
15. Freester near Loch Benson, South Nesting
16. Helli Ness

Wind Farm Visibility

-  Visibility of existing turbine
-  Visibility of proposed turbines
-  Combined visibility of existing and proposed turbines

NOTES: Calculated using Earth's curvature (radius 6360km) and atmospheric refraction coefficient of 0.075. Terrain data is derived from OS Terrain 50 gridded height data.

ZTV calculation does not take into account any surface features such as trees and buildings.

Blade tip height - 149.9m
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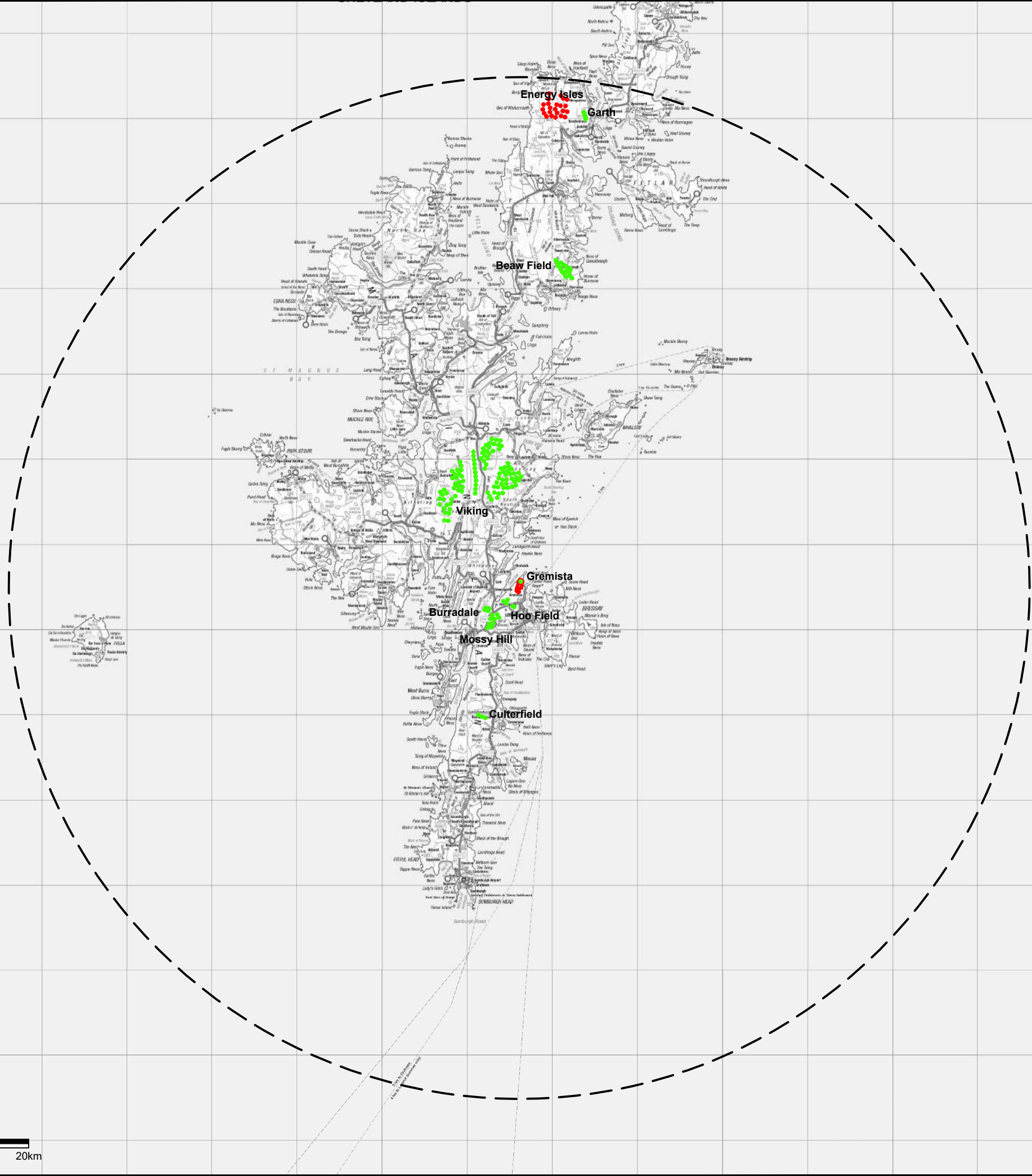
Luggies Knowe

Figure 4.2
Comparative ZTV overlaid with Viewpoint Locations

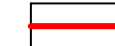
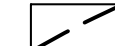
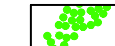

December 2020

LOCATION: Luggies Knowe_002-Viewpoints.dwg

SCALE 1:150,000 @ A3
 0 1 2 5km



Key:

-  Site Boundary
-  Cumulative Landscape and Visual Impact Assessment Study Area
-  Built and Consented Sites
-  Sites in Planning



Luggies Knowe

Figure 4.3
Cumulative Site Plan

December 2020

SCALE 1:500,000 @ A3
0 10 20km

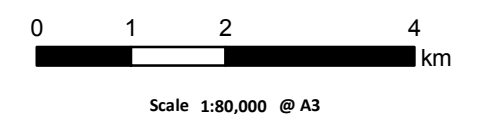


KEY

- Proposed Site Boundary
- Study Area (10 km)

Site of Special Scientific Interest (SSSI)

- Loch of Girlsta
- Lochs of Tingwall and Asta
- Sandwater
- South Whiteness



Luggies Knowe Wind Energy Project
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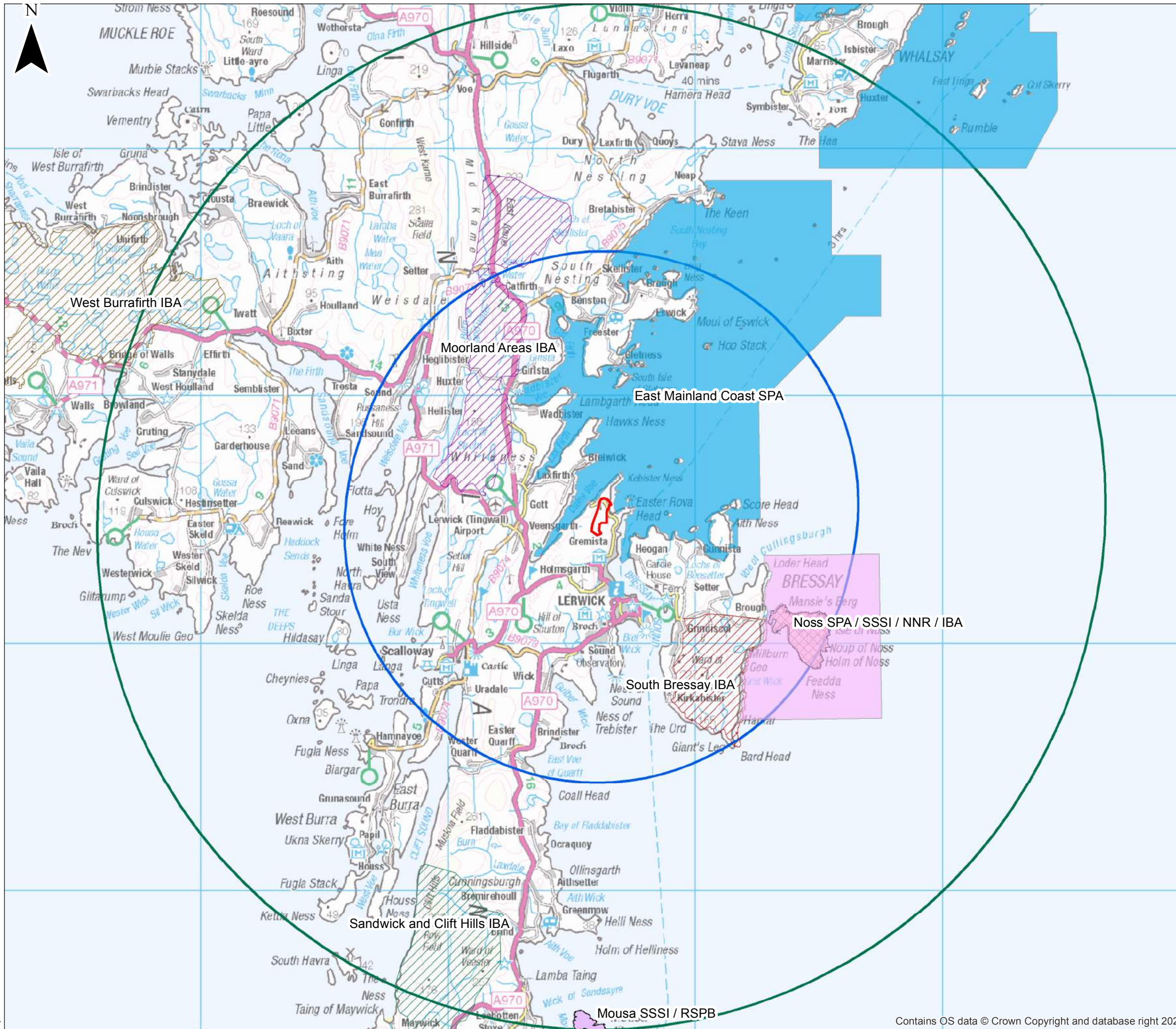
Figure 5.1
Ecological Designations

| | | | |
|------------------|--------------|---------------|-------------|
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KEY

- Proposed Site Boundary
- Study Area (10 km)
- Study Area (20 km)

Special Protection Area (SPA)

- East Mainland Coast, Shetland

Site of Special Scientific Interest (SSSI)

- Mousa
- Noss

National Nature Reserve (NNR)

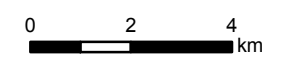
- Noss

RSPB Reserve

- Mousa

RSPB Important Bird Areas (IBA)

- Moorland Areas, Central Shetland
- Sandwich and Clift Hills
- South Bressay
- West Burra



Scale 1:150,000 @ A3



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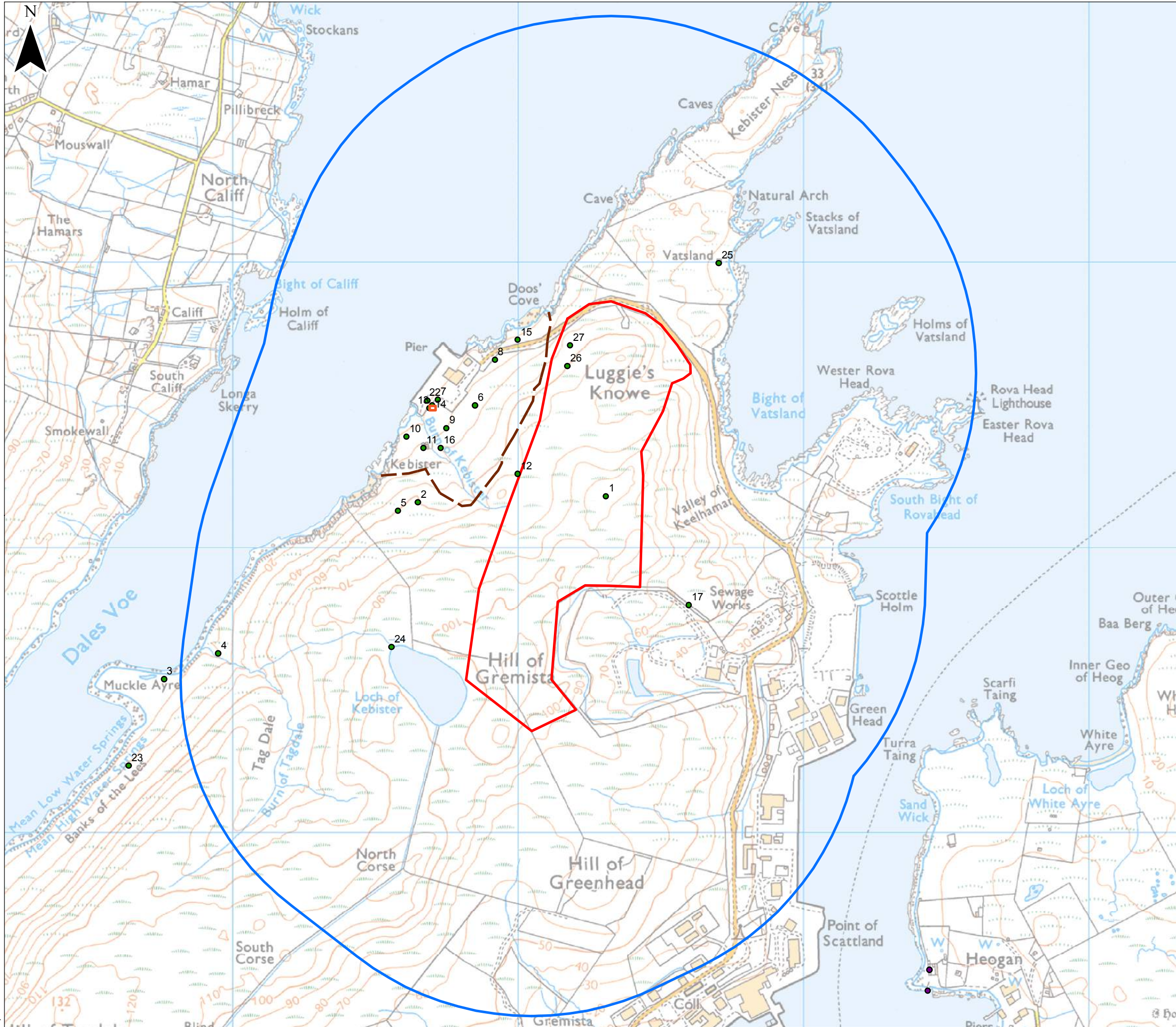
Figure 6.1
Ornithological Designations

| | | | |
|------------------|--------------|---------------|-------------|
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|------------------|--------------|---------------|-------------|

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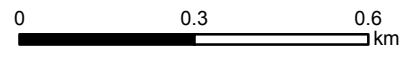
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KEY

- Site Boundary
- 1km Study Area
- Non Designated Heritage Feature
- Kebister March Dyke



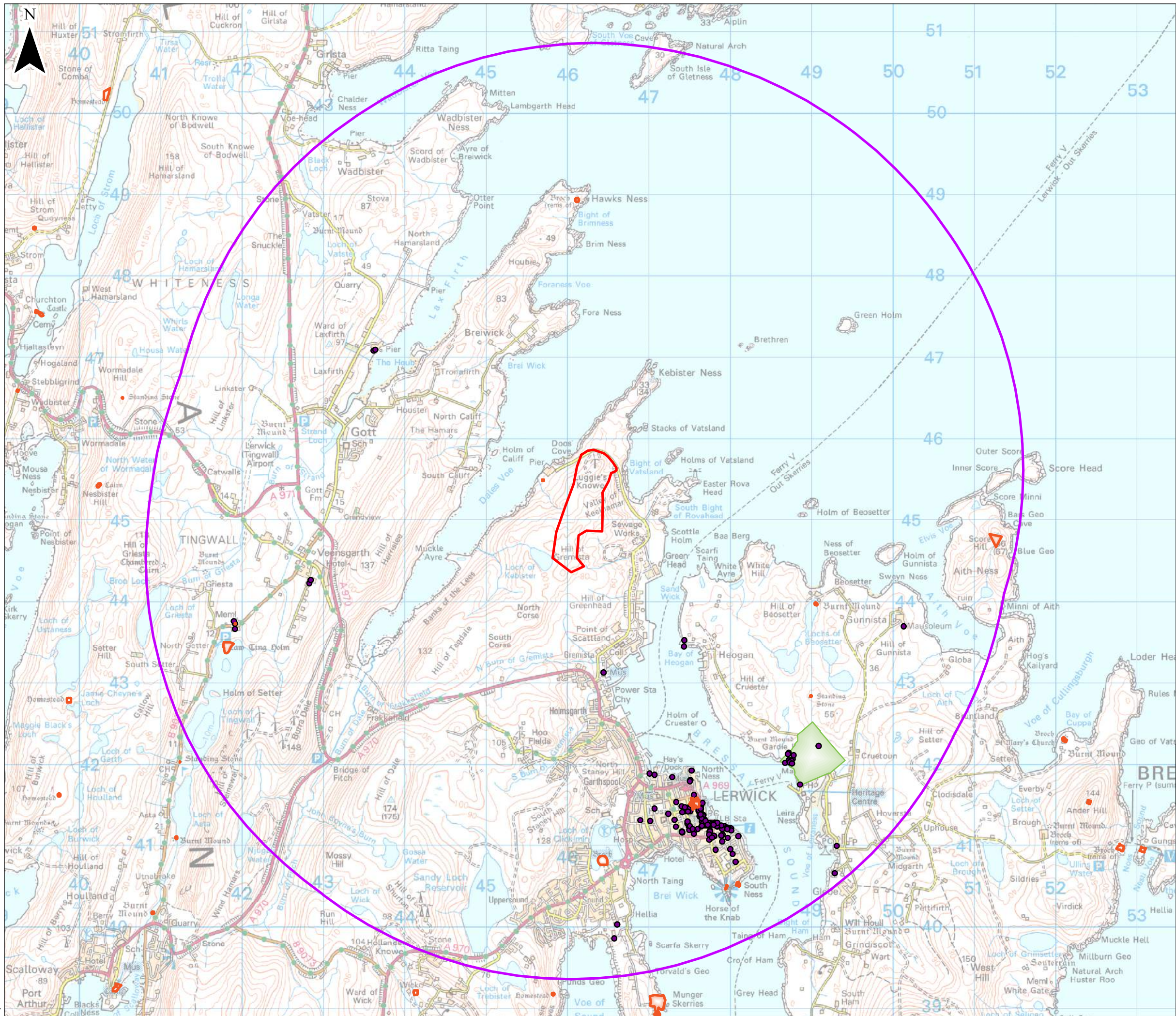
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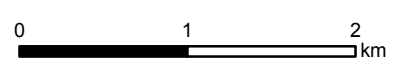
Figure 7.1

Heritage Features within 1km of Site



KEY

- Site Boundary
- 5km Study Area
- Scheduled Monument
- Garden and Designed Landscape
- Listed Building



Scale 1:45,000 @ A3



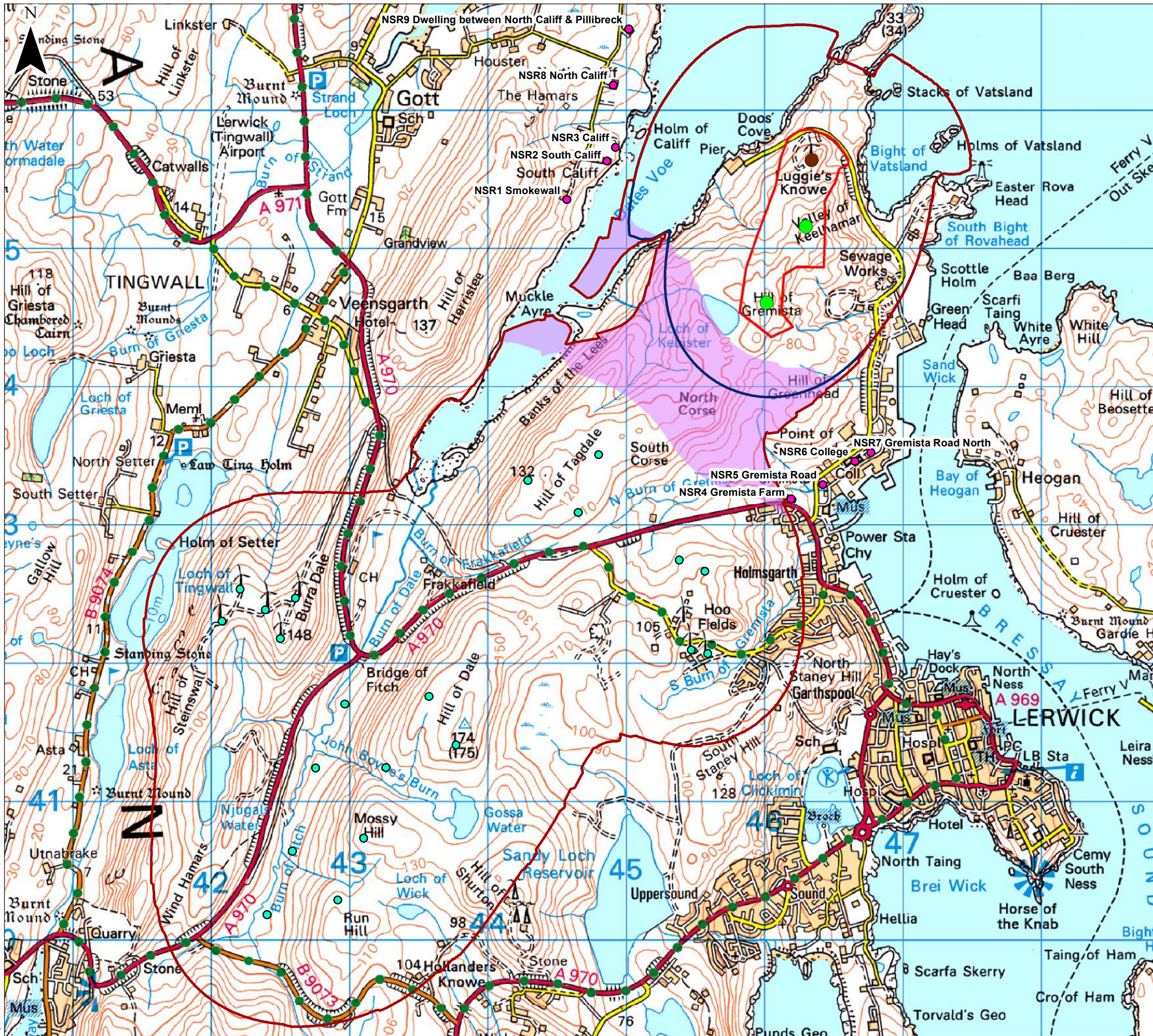
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Figure 7.2

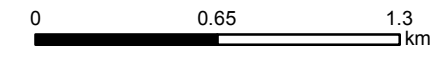
Designated Assets and 5km Study Area

| | | | |
|------------------|--------------|----------------|-------------------|
| Date: 09/12/2020 | Drawn by: LR | Checked by: SO | Version: Draft/V1 |
|------------------|--------------|----------------|-------------------|

Project Number: 3515



- KEY**
- Site Boundary
 - Operational Turbine
 - Proposed Turbines
 - NSRs
 - Cumulative 35 dB contour
 - 35 dB contour - Luggie Knowe only
 - Areas where cumulative effects may occur
 - Identified potentially Cumulative developments



Scale 1:27,000 @ A3

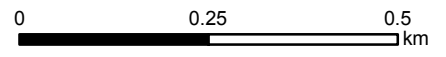


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Scoping Report

Figure 8.1
NSRs, 35 dB contour, cumulative 35 dB contour and cumulative study area



- KEY**
- Site Boundary
 - ▲ Proposed Turbines
 - ▲ Existing Turbine
 - Operational Hardstanding
 - Operational Access Track
 - Major Watercourse
 - Minor Watercourse in proximity to site
 - Water Bodies
 - Flooding at Landfill August 2005 (Shetland Islands Council)



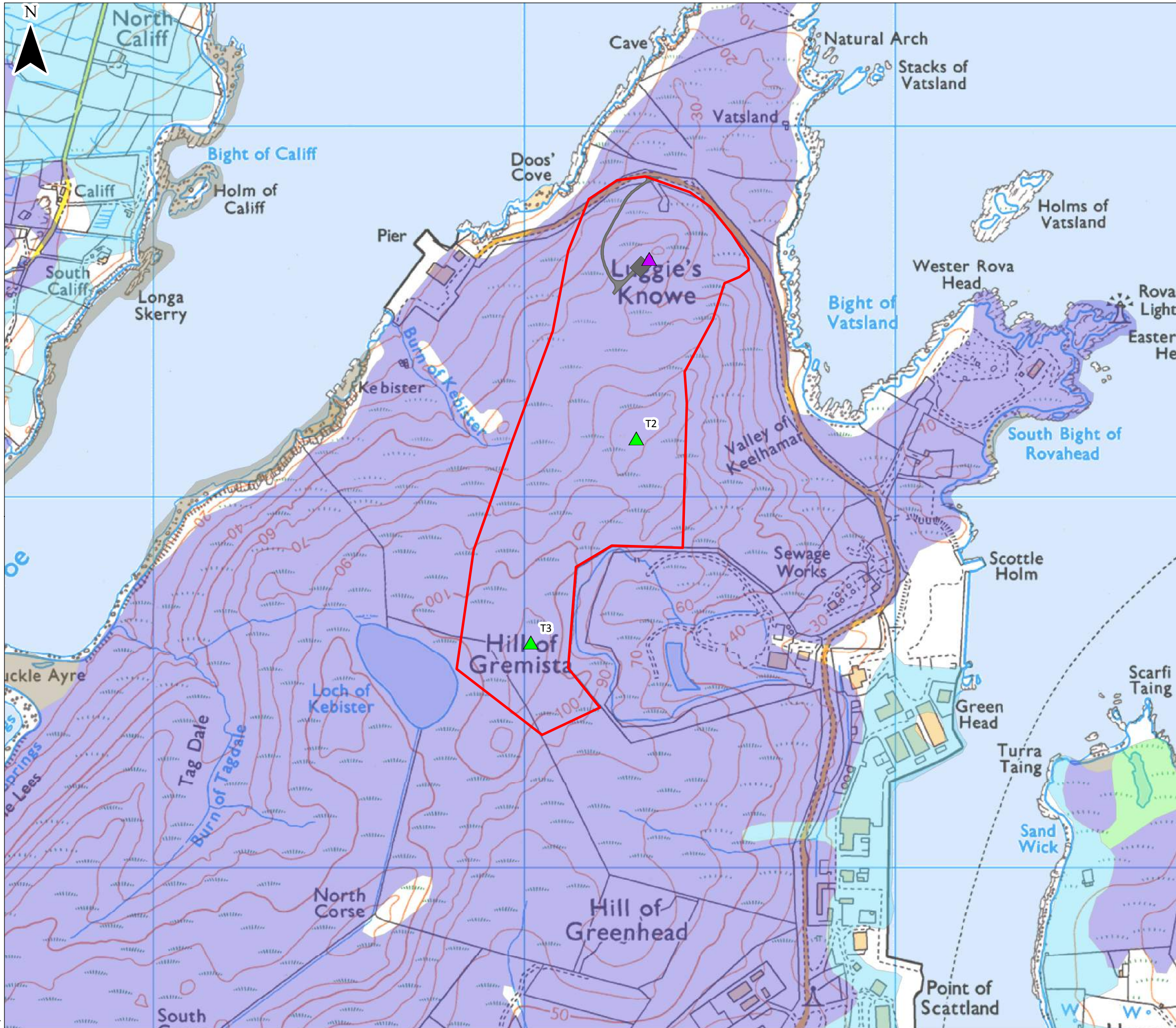
Scale 1:10,000 @ A3



Luggie Knowe Wind Energy Project
Scoping Report

Figure 10.1

Hydrological Overview

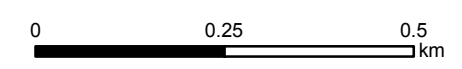


KEY

- Site Boundary
- ▲ Proposed Turbines
- ▲ Existing Turbine
- Operational Hardstanding
- Operational Access Track

Superficial Geology

- Alluvium
- Marine Beach Deposit
- Peat
- Till, Devensian



Scale 1:10,000 @ A3

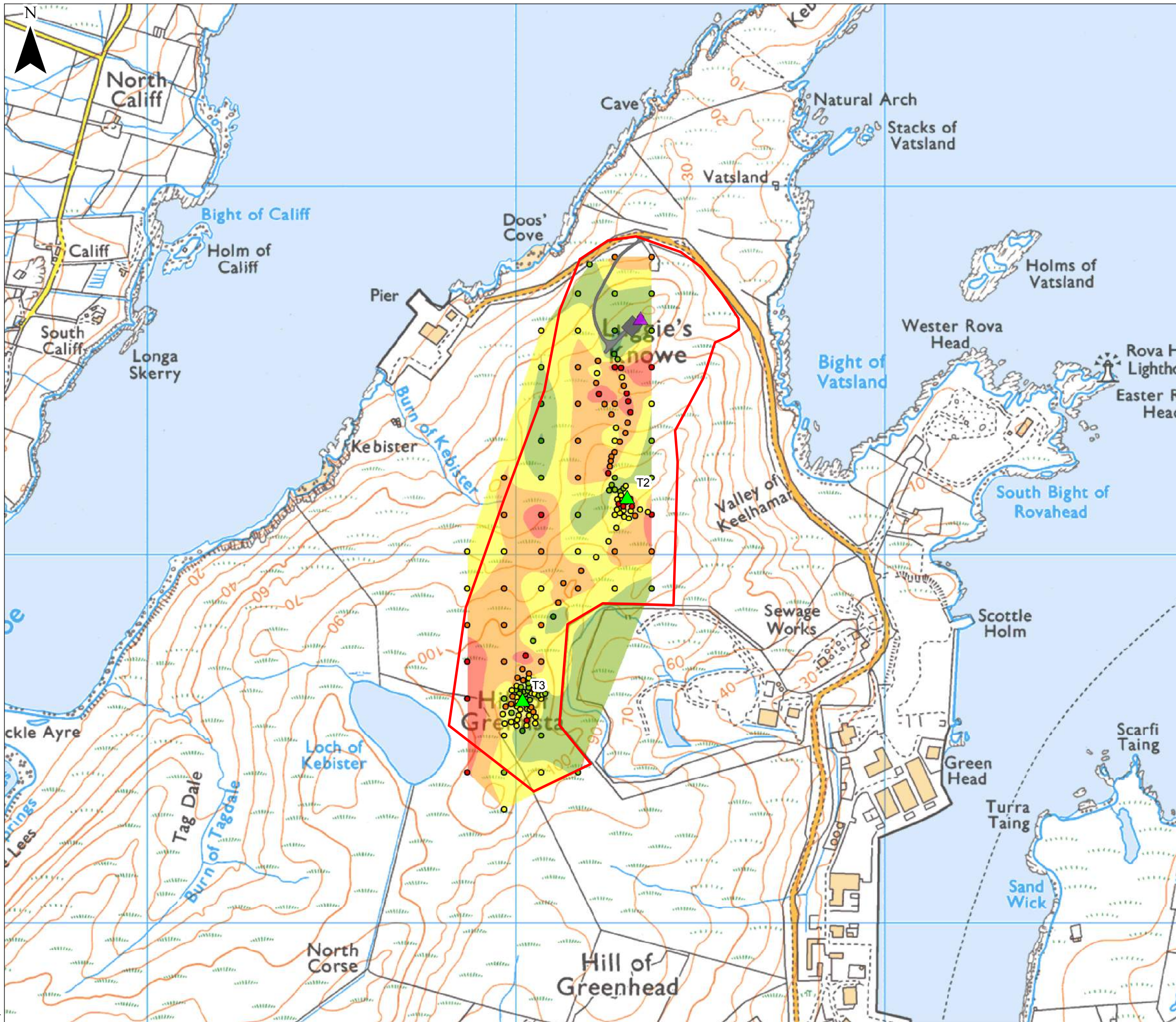


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Scoping Report
Figure 10.2

Superficial Geology

| | | | |
|------------------|--------------|----------------|-------------|
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|------------------|--------------|----------------|-------------|

Project Number: 3515



KEY

- Site Boundary
- ▲ Proposed Turbines
- ▲ Existing Turbine
- Operational Hardstanding
- Operational Access Track

Peat Depth

Depth


- 1 - 50cm
- 50 - 100cm
- 101 - 150cm
- 151 - 200cm
- 201 - 300cm

Depth Contour

- 1 - 50cm
- 51 - 100cm
- 101 - 150cm
- 151 - 200cm
- 201 - 300cm

0 0.25 0.5
 km

Scale 1:10,000 @ A3



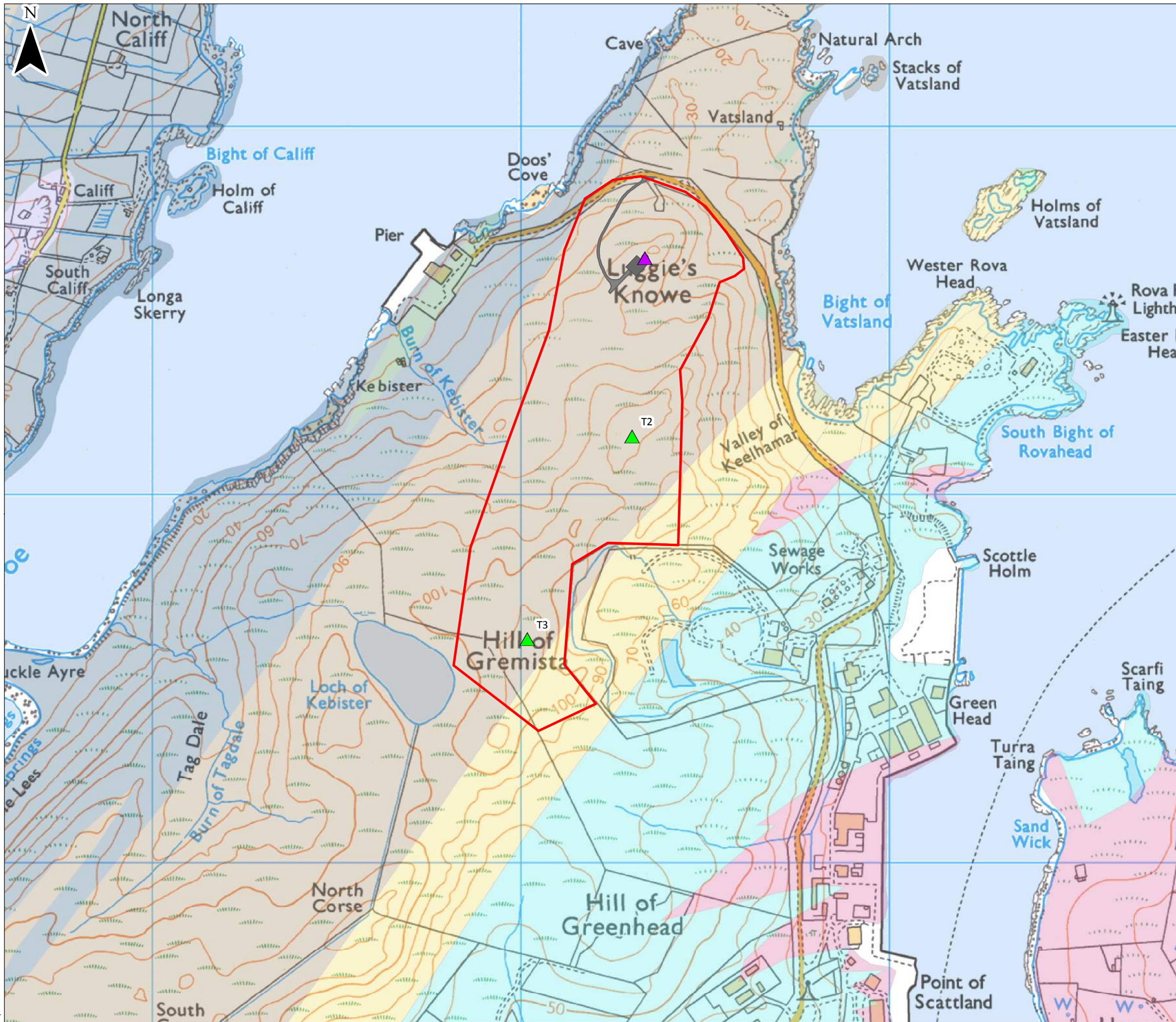
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Figure 10.3

Stage 1 Peat Depth Survey

Date: 15/12/2020 Drawn by: KB Checked by: ZR Version: v1

Project Number: 3515

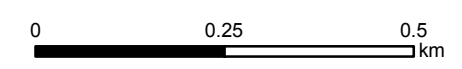


KEY

- Site Boundary
- ▲ Proposed Turbines
- ▲ Existing Turbine
- Operational Hardstanding
- Operational Access Track

Bedrock Geology

- Clift Hills Phyllitic Formation
- Dales Voe Grit Member
- Lerwick Sandstone Formation
- Neeans "Group"
- Neoproterozoic Metamorphosed Mafic and Ultramafic Minor Intrusion Suite of Shetland
- Quarff Succession and Melange
- Rova Head Conglomerate Member
- Whiteness "Division"



Scale 1:10,000 @ A3

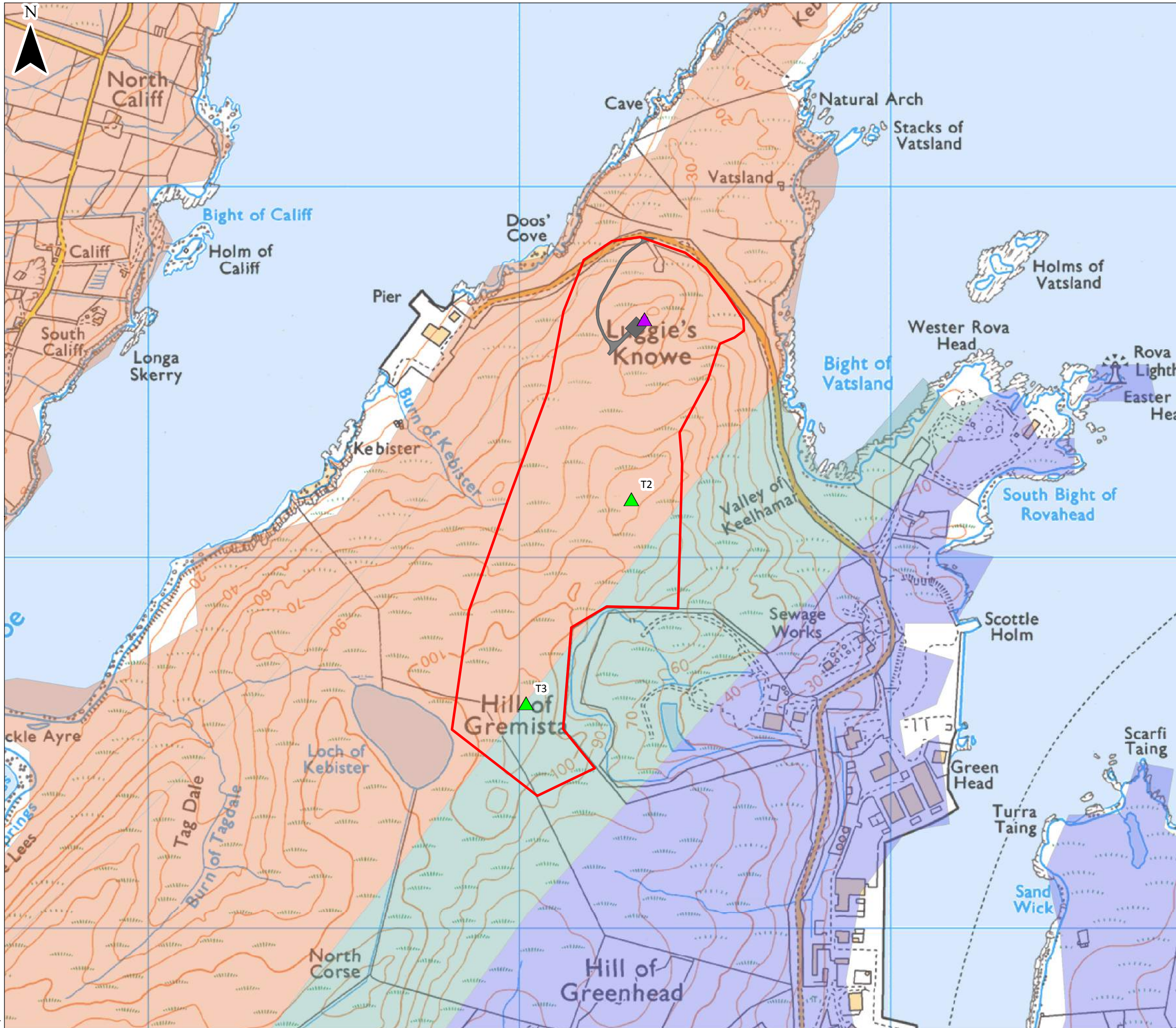


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Figure 10.4

Bedrock Geology

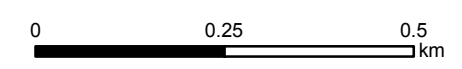
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|------------------|--------------|----------------|-------------|
| Date: 15/12/2020 | Drawn by: KB | Checked by: ZR | Version: v1 |
|------------------|--------------|----------------|-------------|

Project Number: 3515



KEY

- Site Boundary
- ▲ Proposed Turbines
- ▲ Existing Turbine
- Operational Hardstanding
- Operational Access Track
- Sandstones, in places flaggy, with siltstones, mudstones and conglomerates and interbedded lavas, locally yields small amounts of groundwater
- Small amounts of groundwater in near surface weathered zone and secondary fractures
- Small yields where fractured near and from springs locally



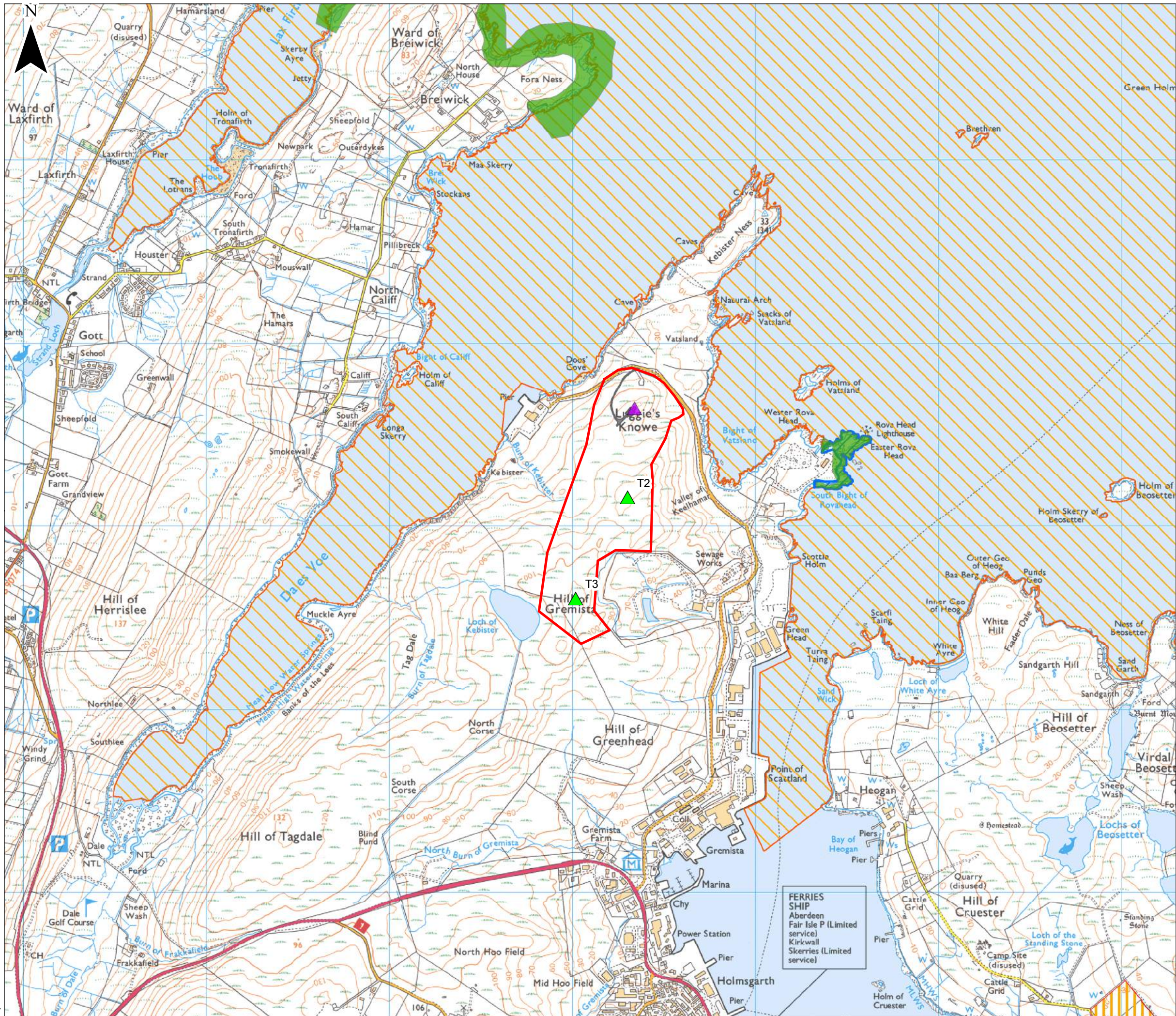
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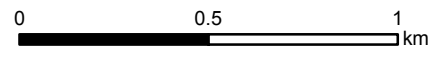
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Figure 10.5
Hydrogeology

| | | | |
|------------------|--------------|----------------|-------------|
| Date: 15/12/2020 | Drawn by: KB | Checked by: ZR | Version: V1 |
|------------------|--------------|----------------|-------------|

Project Number: 3515



- KEY**
- Site Boundary
 - ▲ Proposed Turbines
 - ▲ Existing Turbine
 - Operational Hardstanding
 - Operational Access Track
 - Gardens and Designed Landscapes
 - Geological Conservation Review Site
 - Site of Special Scientific Interest
 - Special Protection Area



Scale 1:20,000 @ A3



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Figure 10.6

Chapter Relevant Environmental Constraints

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Project Number: 3515